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The AUTOMOBILE

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No. 26

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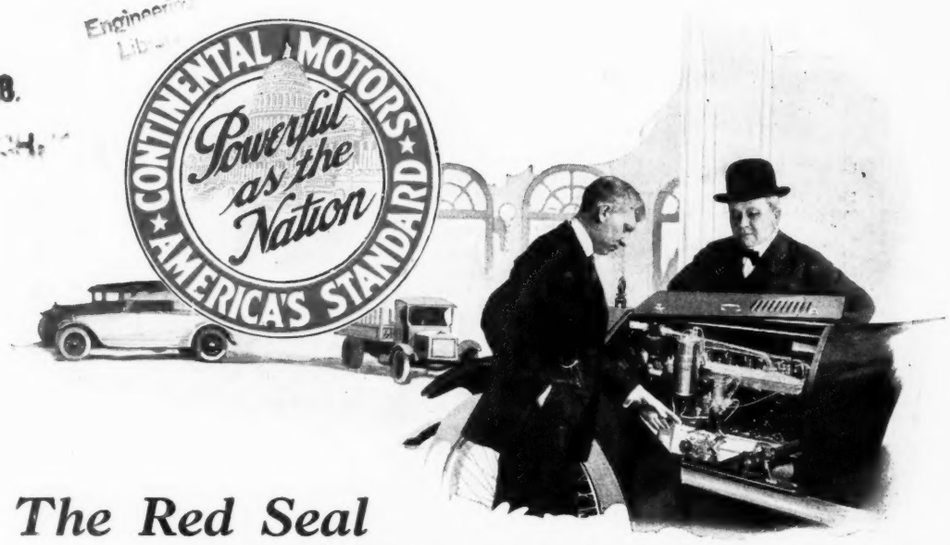

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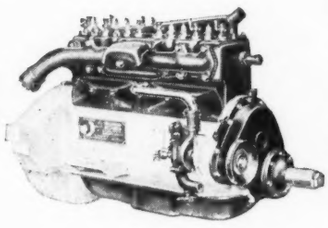

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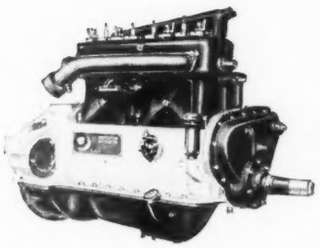

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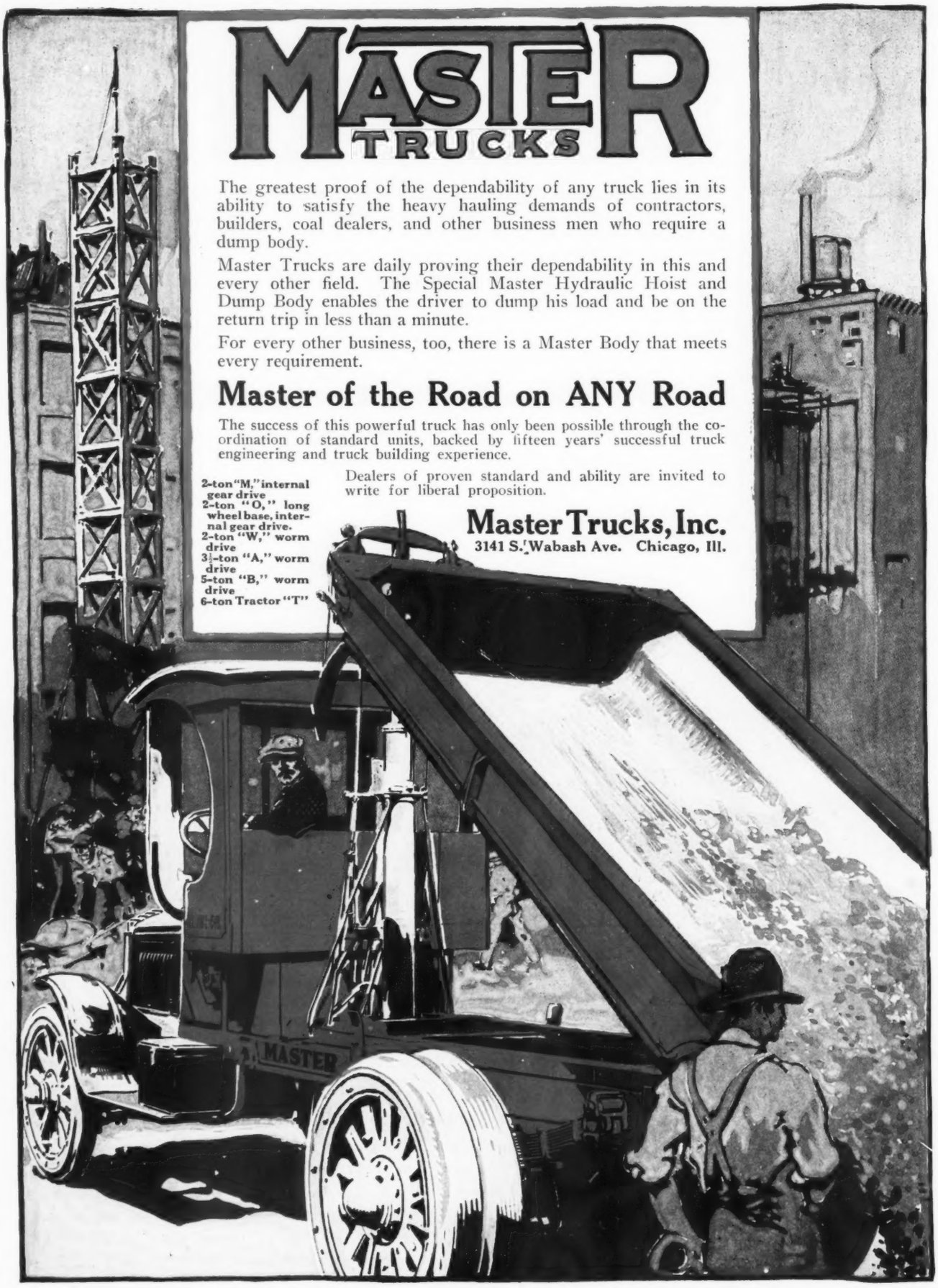


AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XXXVIII NEW YORK—THURSDAY, JUNE 27, 1918—CHICAGO NO. 26

Airplane Production Director Needed

Centralized Authority a Necessity to Co-ordinate Manufacturing Activities— Dayton Better Center Than Washington

By David Beecroft

NEW YORK, June 25—While the aircraft investigations are proceeding, there are still evidences on every hand that the aircraft situation is still in a chaotic condition, and that some master mind is needed to co-ordinate manufacturing and production activities, much the same as Charles W. Schwab is doing with the ship building program.

It would be the most fortunate thing that could occur if the entire manufacturing and production program for aircraft could be transferred from Washington to perhaps Dayton, Ohio, the same as the Shipping Board was bodily moved from Washington to Philadelphia. Similar action should be taken with regard to moving from Washington those offices connected with the production of ordnance apparatus, as well as apparatus for the Quartermaster's Corps and also for the Medical Corps.

That there is still much difference of opinion in aircraft matters is very apparent and there is too much talking along different lines among those closely connected with the work. Although the Liberty aviation engine has demonstrated beyond question of a doubt its superior qualities, there is still too much opposition to it, this opposition coming from some in authority who, one would think, would be closely in touch with our aerial needs.

There are some who would like to stop entirely Liberty engine production and who are enduring its manufacture solely because production has been started and large quantities ordered.

It is very probable that a production director who would have complete charge of manufacturing and production would be able to iron out many of these difficulties.

The opposition to the Liberty engine from not a few Washington authorities has been so ridiculous as to reflect very generally on our airplane program. A case in question is that of a Washington official who took up the rumor that the radiator was not sufficiently large on the Liberty in the DeHaviland plane, and that a new design would be necessary.

This authority was of the opinion that the higher an airplane ascended the higher the temperature became and the greater cooling needed. He obtained his information in Washington. Fortunately, it was possible to get him to some of the flying fields, where his amazingly vague conception of airplane cooling was corrected, and he learned a lesson that he should have learned in childhood. A director of airplane production would prevent such a situation and the delays that generally come because of it.

We have been told that Germany has been building tens of thousands of planes and that quantity is to be the determining factor. In view of this, it

would seem that we should devote every effort to quantity. Yet, notwithstanding this, some of our factories have been instructed to go slow on battle airplanes.

It is almost impossible to understand why such an intimation should have reached some of our factories. While we have been behind in the production of planes for the Liberty engine, there has been some slowing down of production, solely because engines are being given to the Navy in apparently greater quantities than to the land forces. A director of manufacturing and production would be able to take care of such a situation and time distribution to our best advantage.

It is stated that we have in the country to-day practically enough completed JN-4 training planes to serve for the next year. This is an accomplishment to be proud of, but it would be better if our manufacturing activities were so timed that we could be producing training planes just a little in advance of the demand, rather than storing up a supply adequate for a year's use. Such a program would materially relieve the steel situation.

Certain government talk of building government airplane factories would probably be stopped by a coordinated manufacturing and production organization, because we do not need new factories to-day, but what we need is greater engineering activity on the development of new planes so that our program of improvement will be kept constantly moving. One of the largest airplane factories has not been operating at more than 30 per cent of capacity and others have been far below their capacity. All of the available capacity should be taken up before any thoughts of new factories are retained.

With a centralized manufacturing and production organization, we would be in better position to keep closely in touch with the European situation and know to better advantage just what is needed. At the present time too many conflicting reports are being received. These are received by different parties and immediately those who should be directing the work are taking opposite views on the subject with the result that our production output is not what it should be.

A centralized head in the manufacturing program would learn those things from France that are of chief importance. These, coming to the correct military authorities, could get speedy action. We should know the latest information on the best methods of mounting machine guns on airplanes according to the changing conditions of aerial warfare.

We should know if these devices fit an airplane for increasing in importance, and if so, on what particular type of planes. We should know the extent to which quantity is a superior factor to quality in a plane in present and future aerial combat. We should know the latest information on the number of machine guns that should be synchronized for firing between the propeller blades and how many machine guns should be carried on the different planes, and what are the best methods of mounting.

We should know what equipment is most necessary on the different types of planes at the front. We should know what are the main requirements of the day bombing planes, including the distance they should be able to cover, the speed and load carrying capacity, as well as the amount of armor needed on them. We should have a similar line of information with regard to night bombing planes.

With all of this information laid before the American airplane industry, it would be possible to concentrate American engineering originality on these problems and develop many new things that could be brought to the attention of the proper authorities as well as the production board. This would be the start in making America the leader in the development of aircraft, rather than a trailer. So long as we continue to just adapt to our manufacturing connections those designs in

Getting Ready for the Boche

British airmen fixing a load of bombs beneath the wings of a night bombing plane

Europe, we are reaming a trailer in the development of aerial apparatus.

America has a national reputation as being the great developer of apparatus and she has the engineers that are capable of placing her in a position of leadership in the development of new apparatus. Such development work would be closely connected with our manufacturing and production program; in fact, the closer it is connected with such a program the speedier it will be carried into effect.

There is very little that can be learned regarding aerodynamics from Europe, as this subject is entirely understood by many in America. What our engineers need is that information regarding types of machines, equipment and special requirements which our daily experience at the front is teaching.

Future development of aircraft will very largely be in proportion to the development of engine power in relation to weight. We have now engines giving out 1 horsepower for approximately every 2 lb. of weight or a little less. There is no reason why America should not be the leader to develop an efficient airplane engine producing 1 horsepower for every 1.5 lb. weight, or perhaps less. We should endeavor to get the jump on our enemy in this particular and be able to develop planes in this country that will prove one of the surprises of the war.

Speed in an airplane is an enormous factor, and the engineering and manufacturing energies of the country should be properly directed to the attainment of the same.

Since the first of the year there have been something like seventeen different investigations of aircraft work, and in practically every investigation those doing the work have thrown up their hands before the task has been completed. They have been literally appalled at the magnitude of our aircraft work and have admitted their incapacity to investigate it. This in itself is a plain reason why we should co-ordinate and centralize on such a huge manufacturing program. The appointment of one director of this work and the co-ordination of all manufacturing and production activities under his head would merely be reducing the airplane manufacturing program to a commercial basis.

Such an official could be located at Dayton, Ohio, which we would think the best place for it, as in that city is located McCook Field, the government experimental station, as well as the large Wilbur Wright Field, and one or two aviation factories.

The same manufacturing program must be applied to aviation that will apply to successful factories in other industries, and the only way to accomplish this and to accomplish it speedily is to put one competent business man in charge and give him the necessary powers to carry out the work. He must be furnished with the necessary organization and must be freed from military red tape and left free to conduct all work as he would conduct it in his own factory.

American Seaplane to Fly the Atlantic

Rolls-Royce Equipped Machine Carrying Three Men Probably Will Go via Newfoundland and Azores in September—At 95 M. P. H. Time Will Be About 40 Hours

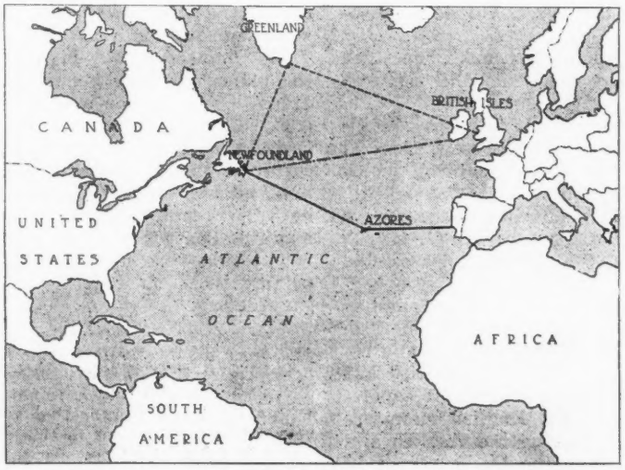
WASHINGTON, June 21.—An American-built seaplane probably equipped with a Rolls-Royce engine, carrying a navigator, two pilots and a mechanician, will leave Newfoundland for Portugal via the Azores on the pioneer flight across the Atlantic Ocean in September or Ocotber of this year.

This was one of many important statements made here to-day by Major General William Brancker, Comptroller-General of Equipment of the British Air Council and head of the Royal Air Forces. General Brancker is in this country on a special mission and at the same time to give his experiences to the new organization heading aircraft work in this country.

The pioneer airplane, stated General Brancker, will carry sufficient fuel for the entire journey. The trip will cover 2000 miles, 1200 to the Azores and 800 from there to Portugal. The time consumed will be less than 40 hr.

September or October will be the month in which the flight is to be made because the best weather obtains then. It is expected that swarms of airplanes equipped with Liberty engines will be flying over the Atlantic within a few months after the first experimental trip.

The hilly lands of the Azores make construction of an aerodrome difficult and will require time, hence the first plane will be a seaplane capable of landing in the harbor. As the flight takes slightly less than 40 hr. it will, theoretically, use 20 per cent of the first life period of the average engine—200 hr. —but in all likelihood will practically consume between 10 per cent and 15 per cent, since the engines will not be subjected to either "stunts" or the strains of fighting.



The three most probable routes for a transatlantic flight: via Newfoundland and the Azores, via Greenland and direct to Ireland

The speed average for the first journey will probably be 95 to 85 m.p.h. by engine power with an additional 10 miles by wind power. Flights have been considered by way of Greenland from Newfoundland, by way of Ireland from Newfoundland and via the Azores from Newfoundland. The Azores route has been selected, despite the fact that it is several hundred miles further than the Ireland trip, because the best weather conditions exist there.

The three important considerations in making this journey are as follows:

(1). Engine reliability.
(2). Navigation, which has been mapped out.
(3). Weather forecasts which are a difficult matter but which the meteorological and technical experts are working into satisfactory form.

Seven hundred and fifty horsepower is the minimum required for each airplane for the flights. This will be supplied by using either two Rolls-Royce or Liberty engines as both of these types are capable of more than 400 hp. Wireless equipment will be carried on each airplane, and a number of the new submarine chasers also equipped with wireless will be scattered over the route so that airplanes in distress can signal for aid.

The first flight will be made with every precaution possible. The plane will probably ride at an altitude of 5000 ft., from which point it can see ships at great distances and with clear weather will observe the Azores at 100 miles distance.

Prefacing his comment on the pioneer flight, General Brancker said:

"An enterprise which must be carried out as soon as possible is the flight of the Atlantic. Once this has been established, America's output of big bombing machines can proceed to Europe by air and so save the shipping that is so invaluable for other purposes. This may seem a wild statement, but we must remember that in 1914 the flight of the English Channel was considered a wonderful and dangerous performance. Since then thousands of British airplanes have crossed the channel and but one life has been lost by drowning.

"There is really no reason why a considerable number of big airplanes and seaplanes should not cross the Atlantic during next summer, and the sooner a pioneer proves the flight not only to be possible but comparatively safe, the better can the wonderful resources of America be employed toward winning the war."

Secretary Baker and Major General W. L. Kenly, Chief of the U. S. Aeronautics Division, both expressed keen interest. Secretary Baker stated:

"This plan for a trans-Atlantic flight is a very daring and tempting speculation, and anything the War Department can do to help it to a successful conclusion will be done."

General Kenly confirmed the statement that the proposed flight will be undertaken.

"I believe that the psychological effect upon the enemy and upon our own people which would follow a successful flight by an army or navy plane across the Atlantic would be far greater if the announcement of the successful accomplishment came as a surprise.

"It is true that we are planning such a test, but I hope that our efforts will receive little if any comment until the feat is accomplished."

In his general discussion of the important features of military aeronautics both in this country and abroad, General Brancker developed many pertinent points regarding which our authorities have made little comment.

He spoke in favor of abolition of standardization unless we find the shipping facilities or prove the success of Atlantic flights, and hoped that the United States would not confine itself only to the Liberty engine.

Germany, he stated, is inferior to England because she has standardized her engines. She has been forced by the size of her frontiers to have more airplanes than England and resorted to standardization, thus increasing the quantity but curtailing the quality which comes through frequent experiments and change. The flexibilty of the English manufacturer has been an important factor, making the English airplanes considerably more efficient than the Boche planes in maneuverability.

MAJOR-GENERAL WILLIAM BRANCKER

Comptroller-General of Equipment of the British Air Council and a member of the Air Ministry.

"The efficiency of our manufacture," said General Brancker, "lies not so much in its bulk production as in the high standard of its workmanship and flexibility, by which it can be turned on to the frequent and inevitable new types which must be manufactured in order to keep the progress in aviation.

"Great Britain was even more unprepared than America at the beginning of the war. No airplane engine had been manufactured in the country and the total output of airplanes was probably about 100 a year; these were manufactured either by enthusiastic private designers, who believed firmly in aviation, or by some of the big ordnance firms, who were prepared to lose money in order to keep in line with progress.

"On the outbreak of war, hardly anyone realized the very important factor aviation would be, and consequently it was impossible to start off on a really big scale, and naturally the available resources of the country were needed for the well-established services of the navy and army. Lord Kitchener, then Secretary of State for War, and Mr. Winston Churchill, First Lord of the Admiralty, were both great believers in the value of aviation, and it is to their belief that we owe the comparatively rapid progress which was made.

Airplane Engine Problems

"For the first year of the war we had a most difficult task in educating manufacturers to the new trade with the very small experienced personnel available. Our engine manufacturers were optimistic and thought they could make aviation engines as easily as they had made motor car engines, but they soon found that they had made a great mistake, and it took them many months to realize the high standard of workmanship and the high quality of material necessary.

"It is probably due to the flexibility of our manufacturers that we owe our present superiority to the performance of our aircraft over those of the enemy; Germany, by natural inclination and by the necessity of providing a much wider front and consequently a much larger number of aircraft than ourselves, has tended to standardize on a very few definite types of engine and airplane and consequently has found it much more difficult than we have to improve and keep abreast of the latest developments in aerodynamical design.

"At present we reckon that a well-organized plant should be able to arrive at bulk production of a new type of engine within 9 months of receiving the order and of a new type of airplane within 4½ to 5 months; it has been done quicker in both cases."

Standardization of planes has been accomplished insofar as is possible, stated General Brancker. All of the metal parts of the airplanes have been completely standardized but the rest of the planes change so frequently in type that complete standardization is impossible.

The limiting factor in airplane production is the engine; the planes are now being produced in quantities greatly in excess of the engine production. Large numbers of Liberty engines have been ordered by England from this country for installation in British planes and as many will be used as can be shipped abroad. General Brancker expects that several hundred will be shipped this year and also anticipates that he will probably have several thousand planes in storage awaiting engines by Jan. 1, 1919.

The Liberty engine was described in glowing terms. Its performances on British testing fields were called highly satisfactory.

"The present Rolls-Royce engine," said General Brancker, "was laid down practically during the first week of the war. The original horsepower asked for was 200 to 250. It took 18 months even to develop an engine which would fly satisfactorily, and it is only within the last 6 months that we have obtained an output of the very latest development in this engine.

"So in spite of all the accusations and disappointments in the

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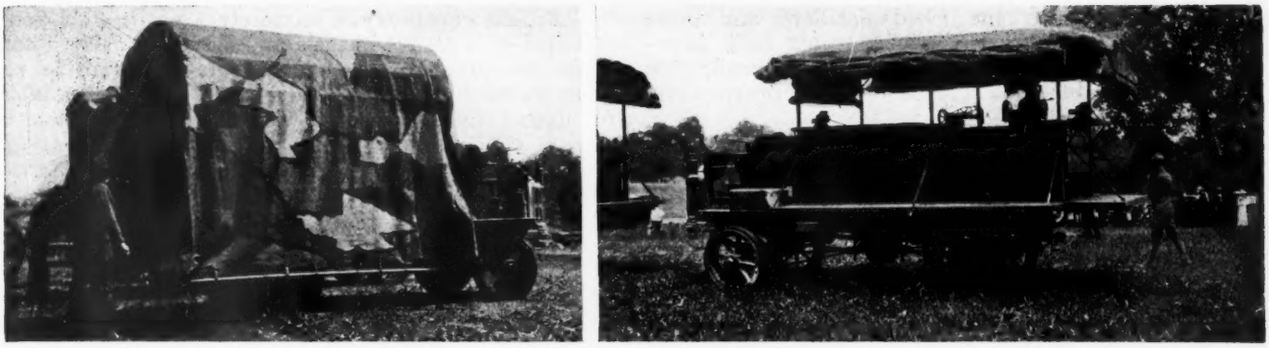
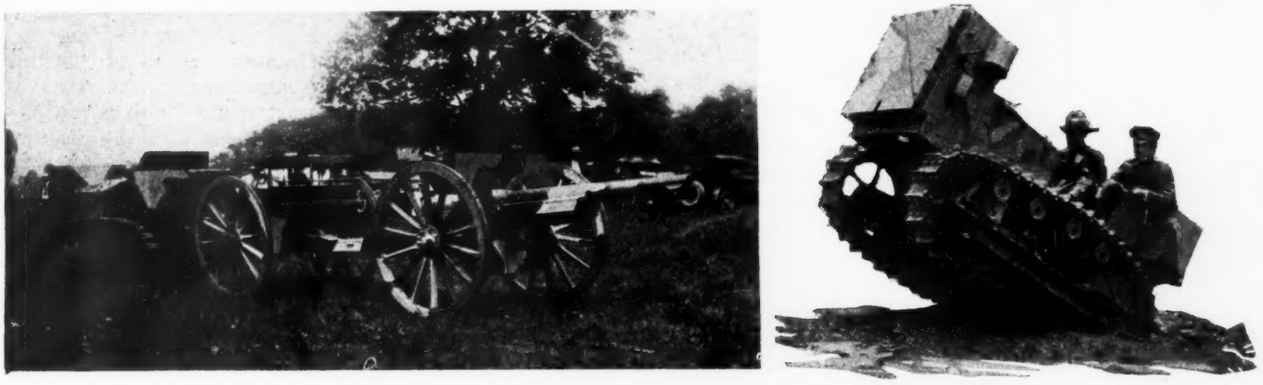


The vehicle at the left is a mobile repairshop, which when not in use is completely covered, the cover in this case having been camouflaged. At the right is one of the tailor shops on wheels that are used for keeping clothing in repair



At the left is shown one of the famous French 75-mm. field pieces being towed by one of the new creeper-type tractors. At the right is another and much smaller creeping machine being demonstrated to show its stability and climbing power

Types of Ordnance Vehicles

Practically Complete Line Exhibited and Demonstrated at S. A. E. Meeting in Dayton

IN order to show the manufacturers of automotive equipment what has been done in a rather unusual line of work and familiarize them with its needs so that they can best apply their manufacturing facilities, the Ordnance Department, U. S. A., exhibited at the summer meeting of the Society of Automotive Engineers at Dayton, Ohio, last week, a practically complete line of vehicles furnished by it to the Army. The vehicles exhibited are typical of large numbers of other ordnance types, and in addition there is a large amount of confidential work on various types of armored vehicles that, obviously, for military reasons cannot be shown.

To clear up any misunderstanding of the relative functions of the vehicles issued by the Ordnance Department and by the Quartermaster Corps, it may be said, in general, that the Ordnance Department vehicles are issued to the Field Artillery, are driven and handled by Field Artillery soldiers, and usually are of types that are more at home where there is no road than where there is one. The vehicles issued by the Quartermaster Corps are usually intended for general transportation purposes, are generally handled by Quartermaster Corps men and operate on reasonably good roads in the rear of combatant troops.

The enormous size of the artillery supplied a modern army has proportionately increased the vehicles furnished to the Field Artillery by the Ordnance Department until the total number of large motor vehicles issued considerably exceeds that issued by any other corps, and perhaps all others put together.

It is upon the vehicles issued to the Field Artillery that the success of an army largely depends, for no successful advance can be made unless transportation is available for moving up the guns after the first rush and a retreat may become a disaster if transportation is not available for keeping the guns out of the hands of the enemy. It is for this reason that the American artillery regards it as essential that vehicles must be definitely assigned to their guns at all times and these vehicles must be manned by Field Artillery troops.

This arrangement, under trench warfare conditions, appears at first glance to be uneconomical, but it must be remembered that the day is coming when trench warfare will be ended and there will be an advance under open warfare conditions that means final victory for one side or the other, and that is the day that must not be lost sight of.

Meanwhile, careful local arrangements easily handle any apparent overlapping of functions between the

vehicles manned by the Field Artillery and those manned by the Transport Service, which have developed due to the temporary trench warfare conditions.

The exhibit included the following ordnance vehicles:

Artillery repair truck,	Truck-tractor, 3-ton, model 1918,
Equipment repair truck,	3-in. gun trailer,
Light repair truck,	10-ton trailer,
Reconnaissance and machine gun car,	2½-ton artillery tractor,
Staff observation car,	5-ton artillery tractor,
	10-ton artillery tractor.

The artillery repair truck is a standardized machine shop furnished to motorized batteries of field artillery, to ammunition truck companies and to the smaller mobile repair shops. The general equipment includes a gasoline-driven generator to furnish power, a lathe, a drill press, a bench grinder, an air compressor, a blacksmith's outfit and an electric drill. The small tool equipment is necessarily much more complete than is usually provided, as this vehicle is attached to organizations the equipment of which ranges from the finest optical instruments to heavy tractors.

The equipment repair truck uses the same body as the artillery repair truck, but instead of being equipped with machine tools, it is equipped with benches, bins, sewing machines and hand tools adapted for the repairs of machine guns, artillery harness, infantry equipment, rifles, etc. One of these trucks, aside from the convenience of bringing repair facilities immediately to a regiment, saves an enormous amount of material by making minor repairs in time on material that otherwise would soon become unserviceable and be discarded.

The light repair truck is merely a small steel body mounted on a Dodge chassis and serves to carry small quantities of spare parts and tools for roadside repairs to disabled motor vehicles. It is also available for use as a delivery truck wherever such a vehicle is required.

The reconnaissance and machine gun car is mounted on a 1-ton truck chassis and is intended to carry the battery commander, range finders, signalling men, etc., of motorized batteries, together with their range finders, observation telescopes and other apparatus essential to the control of artillery fire. When issued to machine gun organizations it carries the machine gun personnel and also a complement of machine guns and ammunition. The machine guns are not fired from the car, which is merely a means of rapid transportation for the reserve machine gun units.

The staff observation car is an over-size touring body designed to meet the demands of brigade, regimental and battalion commanders of Field Artillery for a vehicle to transport themselves and their assistants with necessary instruments for which the ordinary seven-passenger touring car had been found inadequate.

This body is mounted on a high speed 1-ton truck chassis and will very comfortably carry nine people within the body. A table for studying maps and other conveniences is provided. In the rear and on the sides are large chests for carrying fire control and telephone instruments. A winter top is furnished when required to convert the vehicle into a closed car.

A 3-ton truck tractor was developed by the Ordnance Department to meet the demands of the Field Artillery in France for a very powerful four-wheel drive ve-

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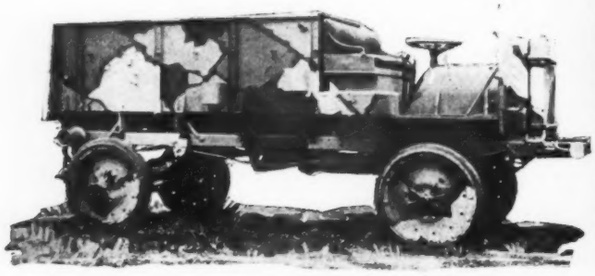
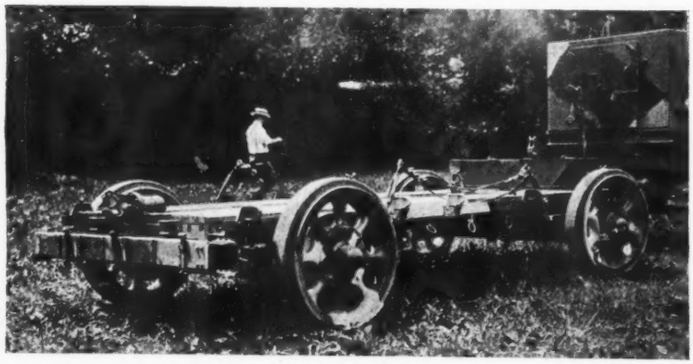
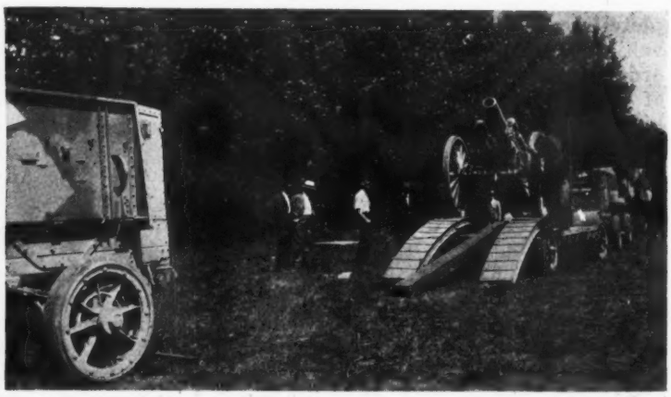


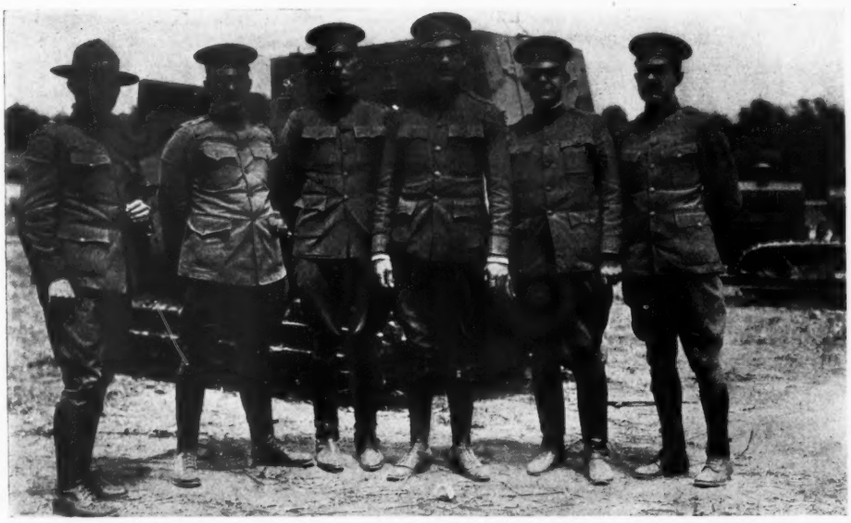


Above is shown the new four-wheel-drive ordnance truck and at the right the type of trailer that is used for a variety of purposes



These views show one of the trailers pictured above used to transport heavy artillery, the picture at the left showing the method of supporting the gun on the trailer and the one at the right showing how the supports are used also as tracks for unloading the gun which is towed off the trailer by the truck

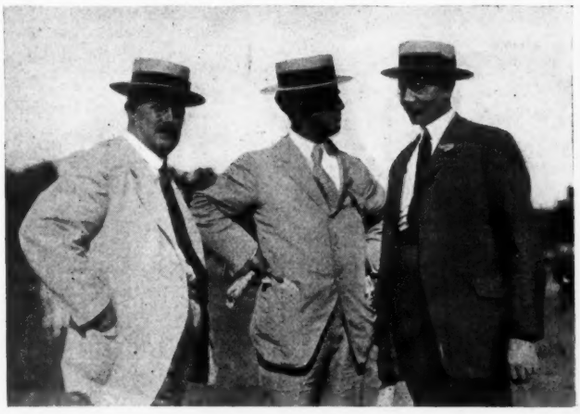
Some of Those Who Attended the S. A. E. Meeting at Dayton



A group of ordnance officers: Left to right: Lieut. Long; Major Morgan; Capt. C. H. Earle; Capt. E. J. Sullivan; Capt. E. H. Chase; Lieut. B. S. Pfeiffer

President Charles F. Kettering

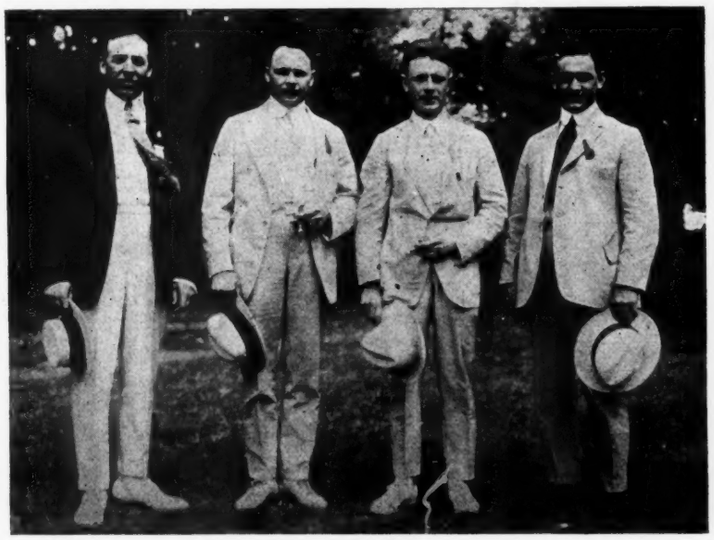
Elmer A. Sperry, Sperry Gyroscope Co.



William P. Kennedy, David Beecroft, Directing Editor Class Journal Co., and Lars Nilson, Nilson-Miller Co.

James Hartness, President Jones & Lamson Mach. Co.

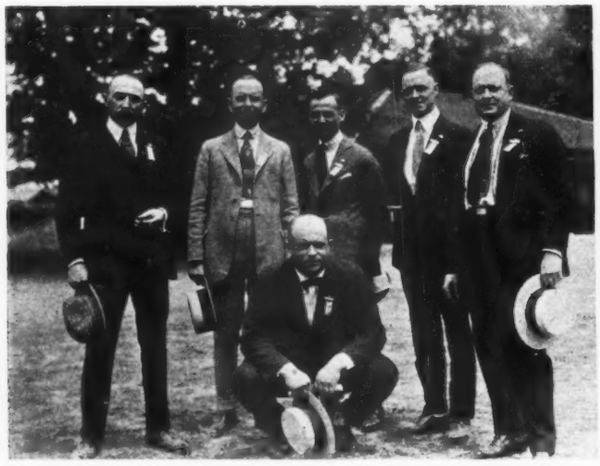
Major Hal Sheridan



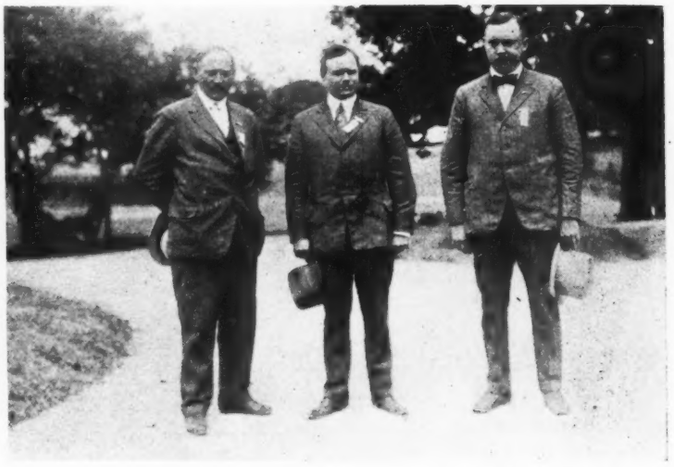
F. Ericson, C. Pearson, G. Duffy and E. Ashworth, all of Canadian Airplanes, Ltd.

Colonel E. A. Deeds

Some of Those Who Attended the S. A. E. Meeting at Dayton



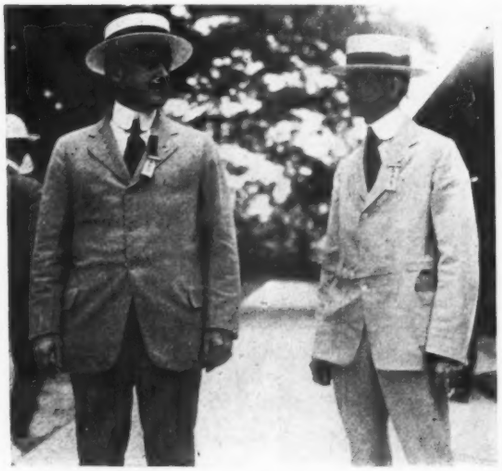
A. de Maringh, H. Wickland, Otto Bruenauer, H. O. Penland, H. W. Parsons and Howard L. Spohn of the U. S. Ball Bearing Co.



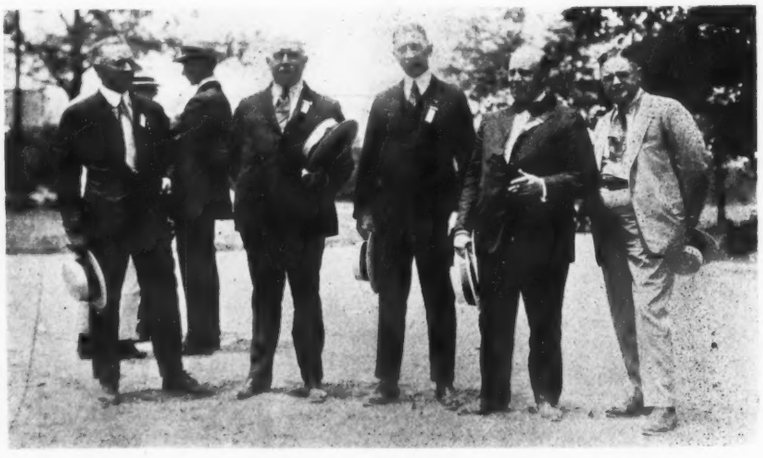
W. W. Totman, Whitney Mfg. Co., and Ralph Murphy, H. H. Franklin Mfg. Co.; James L. Yarian

Benj. H. Blair, Harry Roettinger, R. G. Bradley, R. H. Brown, Dan C. Swander, B. M. Kent, A. C Bergmann, all of the Standard Parts Co.

Walter C. Baker, Standard Parts Co.

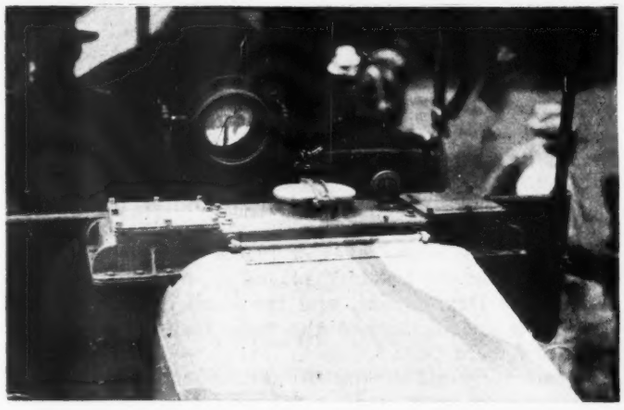


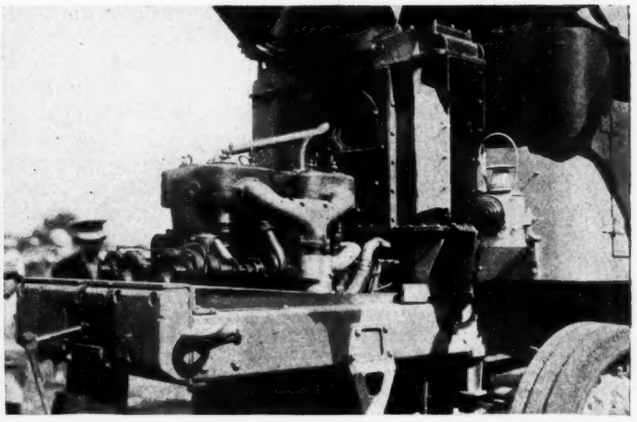
S. S. Bradley, Aircraft Mfg. Assn.; B. L. Williams, Standard Aircraft Corp.



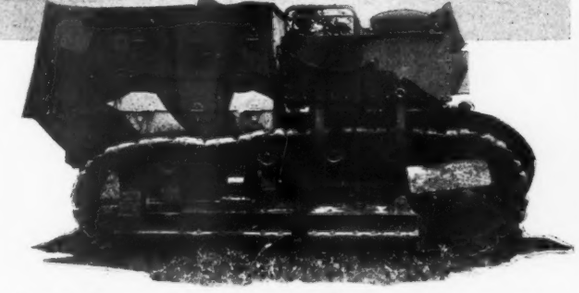
G. G. Brandenburg, Brandenburg & Co.; E. J. Dunn, Eclipse Machine Co.; J. I. Brandenburg; W. L. McGrath, Eclipse Machine Co; F. G. Dickinson, Dickinson Cord Tire Co.

Ordnance Vehicles Demonstrated at the S. A. E. Meeting

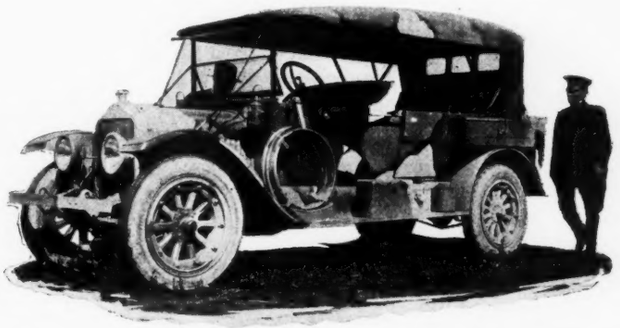




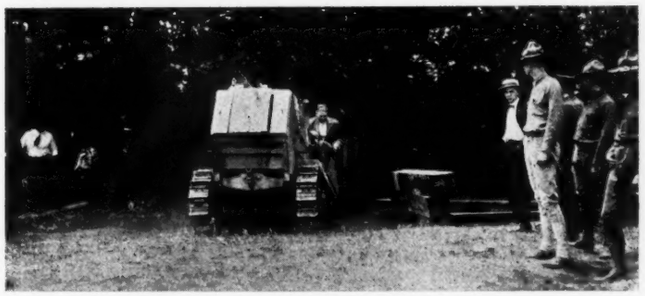
A number of views of the new Militor four-wheel-drive ordnance truck showing its external appearance at rest and in the course of a strenuous demonstration, and some of the details of the hood, radiator and engine construction. The radiator is behind and well above the engine with the fan entirely enclosed. This vehicle is used also as a tractor to haul one or a number of trailers



Two of the mammoth 10-ton ordnance creeper-type tractors which have recently been developed. The one above is a Holt machine and the one below was produced at the Maxwell plant. These are used for hauling heavy field pieces and will go practically anywhere



Type of camouflaged officers' car used by the Ordnance Dept. This is a large touring body built on a truck chassis and having compartments of various sizes and shapes for carrying equipment, maps, instruments, etc.



During the meeting, the various sizes of ordnance creeper and wheeled tractors were demonstrated under all sorts of conditions. They pushed down small trees and climbed over them and traveled through swampy land

Types of Ordnance Vehicles

(*Continued from page* 1250)

hicle for moving guns long distances on good roads at high speed where the services of a track-laying tractor were not required. When used as a tractor this vehicle is equipped with a capstan and sprags and will use two front axles so that it will have a four-wheel steer and, consequently, a very short turning radius.

Wherever possible, parts already in service on Ordnance Department vehicles or those used by other departments were used to simplify the spare parts proposition, and where new parts had to be designed, a maximum of interchangeability was obtained. A typical example was the Wisconsin engine used in a great many thousand other ordnance motor-vehicles and the ease with which the vehicle can be made either four-wheel steer for use as a tractor or two-wheel steer for use as a truck by simply interchanging axles. This model has been adopted as the standard four-wheel drive vehicle for the army.

The 3-in. gun trailer is a special unit intended to carry the smaller size field guns mounted thereon for rapid transportation on good roads. The gun carriages, on account of their construction, would be badly damaged if towed behind the trucks at high speed. The trailer is fitted with removable sides so that when not required for carrying guns it may be used for the transportation of ammunition or baggage.

The 10-ton trailer is similarly intended for the transportation of tractors, wrecked gun carriages and for other special purposes. When not so used, it may, of course, be used as a cargo trailer.

The 2½-ton tractor is intended to have a reserve power of a six-horse team and also the ability to move at high speed, and these requirements have made it probably one of the hardest of the ordnance standard vehicles to design. It is primarily intended for hauling wire-laying reels across country at high speed and it is believed that it will ultimately replace horses on the 75 mm. field guns which are practically the only guns not now motorized.

The motorization of this particular vehicle has been the most difficult up to date, as it has been believed that horses were practically essential. Additional tests in actual fighting will be necessary before it is known whether horses can really be displaced for these light guns.

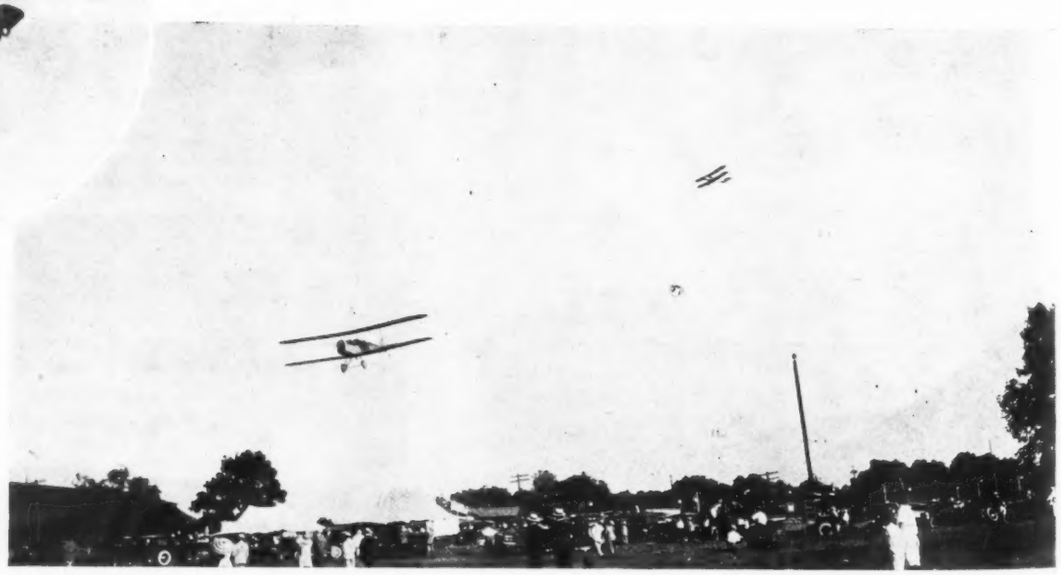
The 5-ton tractor is intended for hauling guns of medium weight at speeds of about 6 m.p.h., although in emergencies the tractors are able to make speeds of 10 to 12 m.p.h. This tractor has distinct advantages over anything that has previously been used under conditions of actual warfare.

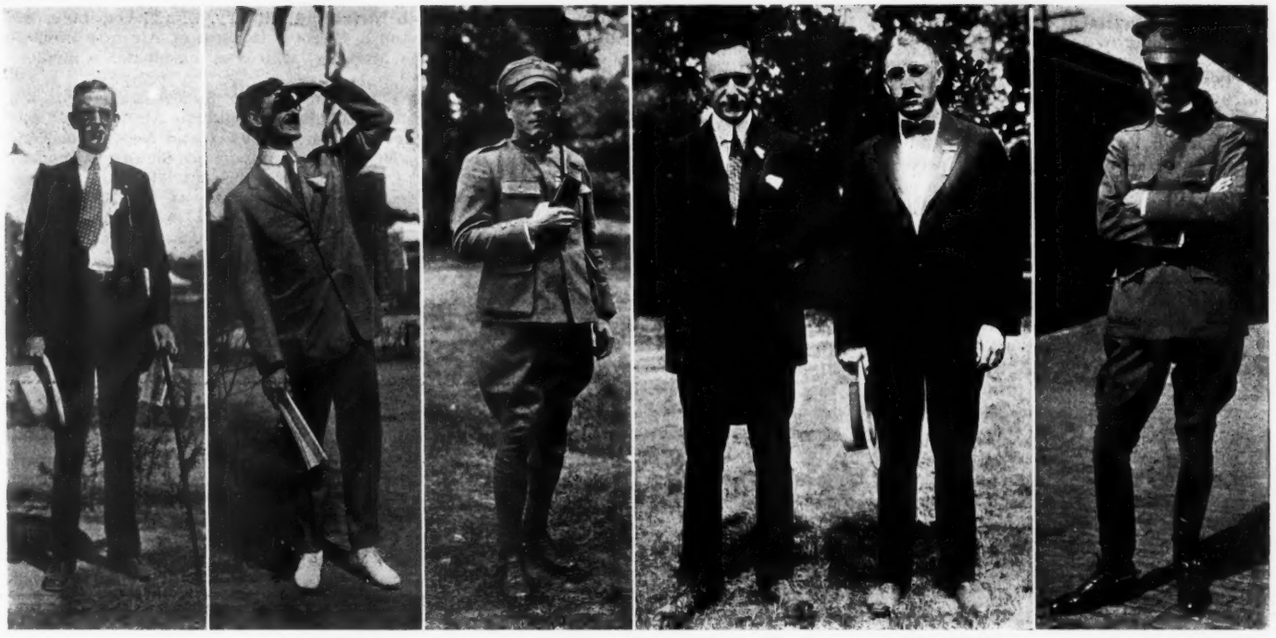
The design and placing of this vehicle in production constitutes a record for a vehicle of a new and unusual type. It was first definitely decided that the type was necessary on Nov. 24, the available preliminary designs were rushed during the months of December and January and the first experimental tractor was produced in 27 working days in January. The total elapsed time from starting design work to demonstrating a tractor from production to the Secretary of War, the Chief of Staff and the military committees of Congress was only a little over 6 months.

The 10-ton artillery tractor is similar in design to the 5-ton, but approximately twice as large and intended for handling heavier loads. This was the first of the standard tractors placed in production by the Ordnance Department, and the earlier models run as far back as 1915, when the first modified commercial tractors were tested.

Practically all of the ordnance bodies are of steel construction, as a century of experience with ordnance vehicles has shown that the serviceable wood bodies for cross country work are of excessive weight, and every pound saved in this work is of great importance, as it means just that much more ammunition at critical moments. The tractors all have their vital parts protected by armor so as to withstand bullets and shrapnel.

Three of the Liberty engined De Haviland airplanes which were flown during the Society of Automotive Engineers' meeting at Dayton last week





F. G. DIFFIN — *Chairman, International Aircraft Standards Board*

W. B. STOUT — *Advisory Engineer Aircraft Production Board*

LIEUT. M. MIOZZI — *Italian Government Representative*

S. E. CAMPBELL — *Tidewater Oil Co.*

C. W. STRATFORD — *Platt & Washburn Refining Co.*

COL. SIDNEY D. WALDON

American Seaplane to Fly Atlantic

(*Continued from page* 1248)

American press over the Liberty engine, America has not done so badly.

"In fact she has done very well in producing a completely developed aerial engine in the space of a year.

"We have watched the testing of engines in France, and they have been tried in England, and the opinion of the British Air Council is that the engine is a really good sound one, which will be of great value for bombing and reconnaissance work as soon as a few of its infantile troubles are eliminated, and this will be accomplished very soon indeed.

"The Liberty engine gives a slightly better performance in both climbing and speed than the Rolls-Royce; it is not yet quite so reliable but there is no reason why it should not be after it has been in general use for a few months and has become really known and understood by those using and manufacturing it.

"We want thousands and thousands of them, but America must remember that the Liberty engine is by no means final, and that already there are engines giving far better performances in fighting machines, which must be manufactured if the Allies are to retain their superiority in the air.

Different Types for Different Work

"In the first year of the war every type of airplane, generally speaking, was used for every type of work, but as the various functions of aviation developed and became clearly defined, different types of airplanes and engines were introduced for the different tasks for which the flying services became responsible. At the present moment we have distinct types for the following different classes of work for the army:

"Corps reconnaissance—the airplanes which carry out all artillery observation and photographic work.

"Fighter (high altitude)—the single-seater fighter of super-performance, which protects the corps reconnaissance and bombing machines, and attacks the hostile endeavors at reconnaissance and bombing.

"Fighter (low altitude)—the single-seater and, if possible, armored machine, which flies low to attack hostile troops on the ground and keeps close touch with the tactical situation.

"Fighter reconnaissance—usually a two-seater of high performance, which goes far afield over the enemy's lines for reconnaissance purposes or for protection of bombers.

"Day bombers—a high-performance, long-range machine, which usually depends for its safety on the hostile side of the lines by flying in formation.

"Night bombers—a machine of great lifting power and easy to fly, which is especially suited for night work; and by degrees we must get on to still larger and better types which will carry bombs to the heart of Germany, either by day or night. Already, in England new types are coming on which will do this."

The real reason, according to General Brancker, that the United States has not made single-seater machines is due to the impression that we could secure an ample equipment from the Allies. That this impression has been corrected is displayed by a news story in other columns to the effect that we are preparing to manufacture large quantities of single-seaters.

England has developed a new airplane which, the General said, has the biggest spring forward of any machine yet developed. Figures concerning it are withheld from the public. Manufacture is said to be very simple and tests have displayed wonderful qualities. The machine has climbed to 29,000 ft. in an actual test, breaking all records. It has done better than 140 m.p.h. and is expected to do 150 miles at 3000 ft. altitude. This machine will be used as a single-seater and has an air-cooled, radial type engine.

The most interesting recent developments in aviation, said General Brancker, include the "low flier," the defense of London by night by means of aerial fighting, the aerial anti-submarine patrol and the attack of Germany by air.

The use of low-flying machines, preferably armored, is growing considerably. The rumors of tank airplanes and armored airplanes are said to be chiefly unfounded, although such planes will probably appear in the near future. England is now working out some highly armored low-flying airplanes which will have the required maneuverability.

Armored Planes a Myth

Both the gas tanks and the pilots will be armored, preference in armor being given in every instance to the gas tanks so as to prevent fire. Many of the rumors of armored airplanes have been caused by fliers with poor marksmanship who attributed their inability to hit the enemy to "armor."

Discussing the low-flying airplane, General Brancker said:

"For the past year the use of airplanes to keep close touch with the tactical situation and to attack troops on the ground by flying at low altitudes down to even 200 ft. has steadily developed and aircraft has been very freely used for this purpose during the retirement of the British army toward Amiens, as many as 240 British airplanes being concentrated at one point flying low over a massed hostile advance.

"They caused very large casualties and completely disorganized

the German movement. There is no doubt that this form of air fighting is going to develop considerably in the future."

Wastage, which includes depreciation through all causes, averages, said the General, from 64 per cent for some types to as much as 114 per cent for others in the course of each 30 days. This, he stated, renders the maintenance of such a number as 100,000 machines entirely impossible.

This matter of wastage is also a confusing one because the various armies use different methods of maintenance. In some instances where a squadron claims to have 100 machines, it makes no allowance for wastage, and inspection often shows as many as 50 per cent out of service.

The British Royal Flying Service observes a plan for maintaining the airplanes of each squadron which provides that 50 per cent of the airplanes are reinforced by extra engines available at the shops behind the hangars. By this and other means when a squadron announces that it has 100 airplanes ready for service, it means that at least 90 per cent are ready at a minute's call while the other 10 per cent can be ready within 2 to 3 hr.

Discussion of guns developed that the Germans and the French have both attempted to use a gun shooting through the camshaft, but it has been found impractical because it fires but one shot at a time. At present the ordinary machine gun is being used, but England is working, as is the United States also, upon a machine gun that will fire thousands of shots per minute and will operate through the camshaft.

Describing the administrative side of British Aviation, General Brancker told of the numerous convulsions and crises that have occurred. Since 1914 there have been three different administrations. The first was the combination of the Royal Flying Corps, Naval Flying Corps, Military Flying Corps and a separate organization called the Royal Naval Air Service.

Each of these different organizations, though loosely joined, competed with manufacturers for aircraft, creating great confusion. There was overlapping, friction and waste of effort. A new air committee under Lord Derby was formed, but, lacking real power, it faded from existence.

"In May, 1916, the first Air Board was formed under Lord Curzon, charged with certain definite functions and called on to make a definite report toward recommending future developments after sufficient experience had been gained. This Air Board came to an end at Christmas, 1916, on the fall of the Asquith government and a new board with greater powers was formed under Lord Cowdray. The novel feature of this organization was that the whole aeronautical supply, both Naval and Military, was placed under the Minister of Munitions, and a Director General of Aircraft Production was created in the Ministry, who was, ex-officio, a member of the Air Board.

"Lord Cowdray's Air Board endured for almost a year. It did very good work and proved conclusively that an Air Minister was necessary if aviation were to have the power and receive the consideration due it as one of the most important factors in modern warfare. As a result of the work the present Air Ministry was created last Christmas with Lord Rothermere as Air Minister, he being replaced last May by Sir William Weir, who had formerly been Director-General of Aircraft Production in the Ministry of Munitions.

"The Air Ministry is controlled by an Air Council consisting of the Secretary of State, an Under-Secretary of State, the Chief of the Air Staff, who is responsible for aerial policy and organization, the Master General of Personnel, in charge of recruiting and training, and the Comptroller-General of Equipment, who is responsible for acceptance, test, storage and delivery of service units of all aircraft and parts and accessories, and for the housing, feeding and clothing of the personnel, and the Administrator of Works and Buildings—he is also responsible for erection and maintenance of aircraft stations. Besides this, the Director-General of Aircraft Production in the Ministry of Munitions is, ex-officio, a member of the Air Council and in a way serves two masters.

"This new organization is proving a great success and will undoubtedly endure. For the first time it has been possible to think of aerial warfare and undertake a great aerial warfare offensive, the results of which may be compared with the results obtained by the Army and Navy.

"On April 1 the Royal Air Forces came into being and the Royal Naval Air Service and the Royal Flying Corps were merged into one."

That this new organization has proved its efficiency by results, the General points out in an example of recent accomplishments and late display of British superiority.

"Since the start of the great German offensive in March, we have had perhaps a greater measure of superiority in the air than ever before. During one week in March, 132 Boche airplanes were driven down by ours and absolutely crashed; 88 others were driven down out of control, and many pilots must have been killed or wounded or so badly knocked about that they also crashed on landing; 6 were brought down by infantry and anti-aircraft fire, while only 40 of our machines were missing, although, of course, a certain number in addition fell on our side which we do not mention specifically, and a good many pilots were wounded or had their machines very badly shot about.

"Great Britain is going on expanding her Royal Air Force, but there are limits, and when we reach them we shall only be able to replace wastage and keep pace with the production of new types which will always be necessary."

Somewhere in France

A reception park and repair depot of the Quartermaster Corps

Tractor Hitch Merits Serious Consideration

Governs Tractive Ability and Steering, as Well as Many Performance Characteristics—Each Tractor Presents a Specific Problem

By J. Edward Schipper

THE location and the layout of tractor hitches is a subject concerning which there has been much discussion among tractor manufacturers. The result of this discussion has not been the general adoption of any clearly defined methods of a standard tractor hitch, but to disclose the remarkable differences of opinion held on this point. One tractor manufacturer will state that there is no place to attach the drawbar except directly beneath the rear axle; another, that the attachment at the rear axle is entirely incorrect and that the hitch should be applied about midway between front and rear axles.

Doubtless much of the difference of opinion is due to different practices of tractor manufacturers in distributing the weight between the front and rear axles. It stands to reason that with the type of tractor in which two-thirds of the weight is carried on the rear axle a different arrangement of the hitch is called for than in a tractor having the weight evenly distributed between the front and rear axles.

The problem to be considered is threefold. First, a sufficient amount of weight has to be placed upon the rear wheels and maintained there to secure the best possible traction for any given weight of tractor. Second, sufficient weight has to be maintained upon the front wheels to provide efficient steering and control. Third, the hitch must be such that the implement is performing most efficiently and is not exerting enough side draft to materially cut into the traction effort.

Neglecting for the time being the torque exerted upon the tractor itself by the driving members in propulsion, the forces which apply on a four-wheel type

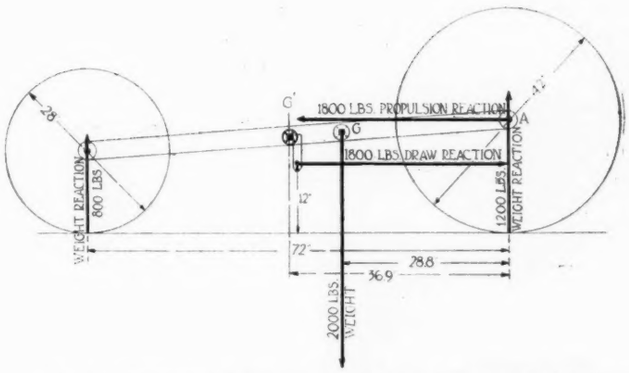


Fig. 1—Diagram showing reactions and forward shift of center of gravity from G to G' neglecting driving torque

of tractor are depicted in Fig. 1. This assumes a tractor of 72-in. wheelbase, with 42-in. rear wheel and 28-in. front wheel. The center of gravity is located 28.8 in. forward of the rear axle, due to the fact that 1200 lb. are assumed to be concentrated upon the rear axle and 800 lb. upon the front axle.

For the purpose of obtaining the relationships of the forces the drawbar is assumed to be attached at a height of 12 in. above the ground at a point midway between the front and the rear axle. The forces at play when the tractor is at rest are: The force of gravity at both sets of wheels (800 lb. at the forward end and 1200 lb. at the rear end) which acts downwardly through the center of gravity and is equal to the weight of the tractor, 2000 lb. As soon as the drawbar load is applied, which is assumed in this case to be 1800 lb., a propulsive effort of 1800 lb. is transmitted to the rest of the vehicle through the rear axle bearings.

Taking moments about the center of the rear axle we find that the drawbar exerts an unbalanced moment about this point equal to 1800 lb. times 9 in., or 16,200

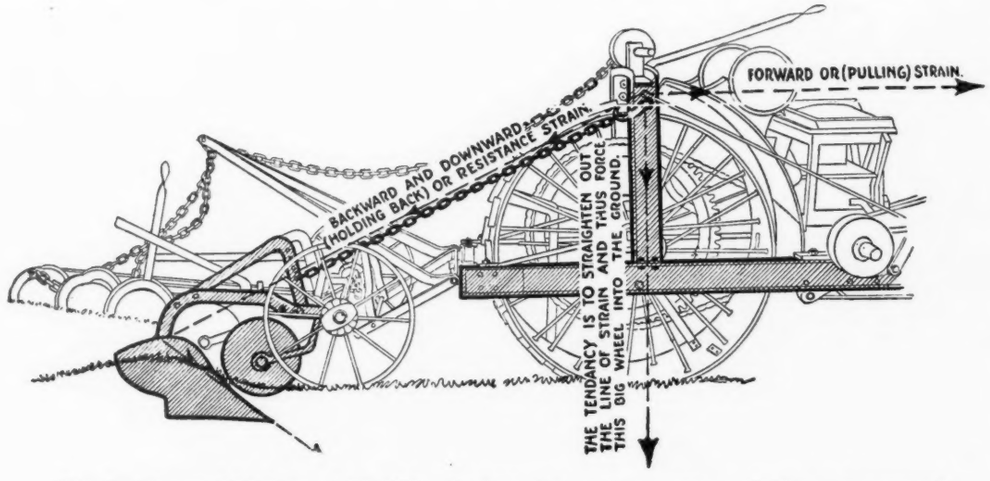

FORWARD OR (PULLING) STRAIN.
BACKWARD AND DOWNWARD (HOLDING BACK) OR RESISTANCE STRAIN.
THE TENDANCY IS TO STRAIGHTEN OUT THE LINE OF STRAIN AND THUS FORCE THIS BIG WHEEL INTO THE GROUND.

Fig. 2—Unusual hitch in which high attachment is used to secure a resultant downward thrust on driving wheels

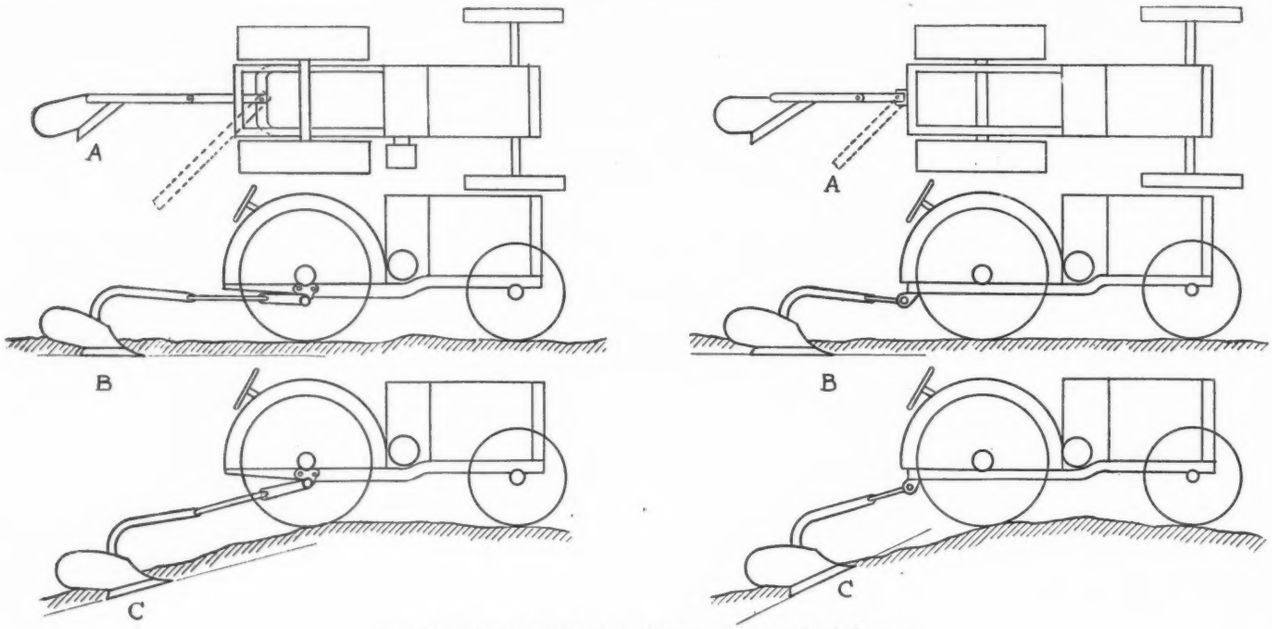
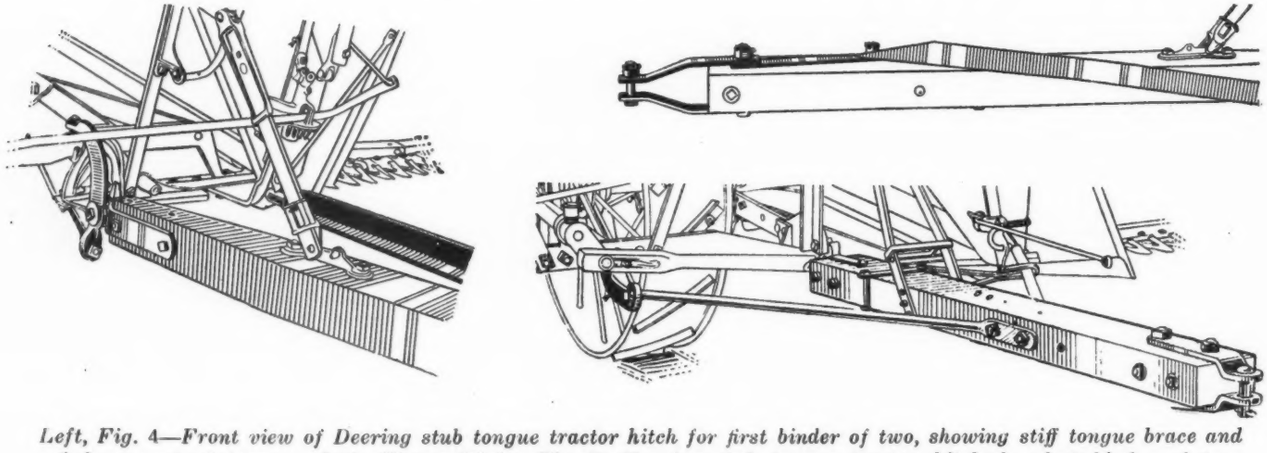


Fig. 3—Effect of hitch before and at end of frame



Left, Fig. 4—Front view of Deering stub tongue tractor hitch for first binder of two, showing stiff tongue brace and reinforcement of tongue pivot. Upper Right, Fig. 5—Deering stub tongue tractor hitch for first binder of two, showing clevis on stub tongue. Lower Right, Fig. 6—Front view of McCormick stub tongue tractor hitch for first binder of two, showing clevis on stub tongue and additional tongue brace

in.-lb. This moment acts in a counter-clockwise direction and puts an additional load on the front wheels, producing an effect which is equivalent to moving the center of gravity forward to the point *G'*. As stated, this calculation neglects for the moment the torque reaction on the frame.

The attachment of the drawbar load below the rear axle exerts additional pressure on the front wheels and consequently tends to relieve the load on the rear wheels with a decrease of traction. In the case illustrated by Fig. 1 the center of gravity is thereby shifted so that it is nearer the front wheels than the rear wheels, and instead of the tractor having 800 lb. on the front wheels and 1200 lb. on the rear there is now more than 51 per cent of the load on the front wheels.

An amazing fact in connection with the problem of tractor hitches is that in spite of the wide variety of hitches in use tractor manufacturers are securing 85 to 90 per cent of the weight of the tractor in drawbar pull. When a tractor weighing 4300 lb. is able to exert a drawbar pull of 3900 lb., pulling three 14-in. bottoms under any condition, it is quite certain that the

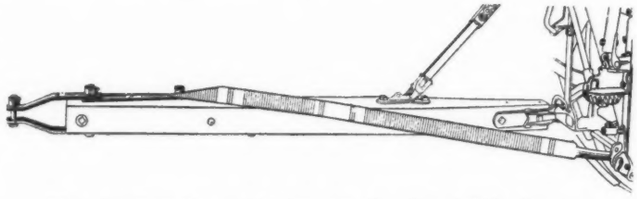


Fig. 7—Deering stub tongue tractor hitch for one grain binder alone, showing clevis on stub tongue and stiff tongue brace

hitch cannot be far wrong. Yet others obtain approximately equal results with entirely different hitches.

Ridiculous claims are still being made concerning the benefits derived from certain types of hitches. It is, of course, absurd for a concern to state that it is possible to create additional power by the method of attaching the drawbar. From an engineering standpoint a statement of this kind is so far-fetched and impossible as to make it unworthy of analysis. The point at which the drawbar is hitched has nothing whatever to

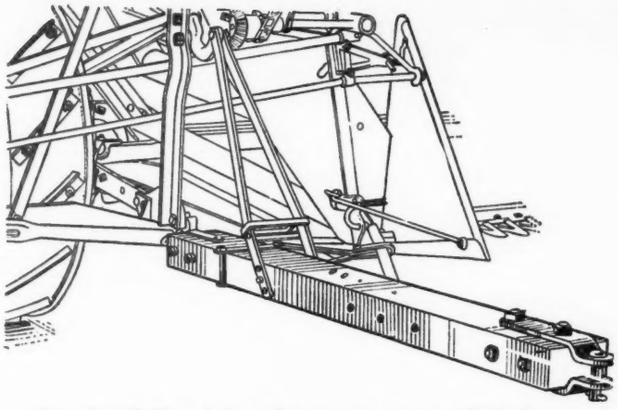
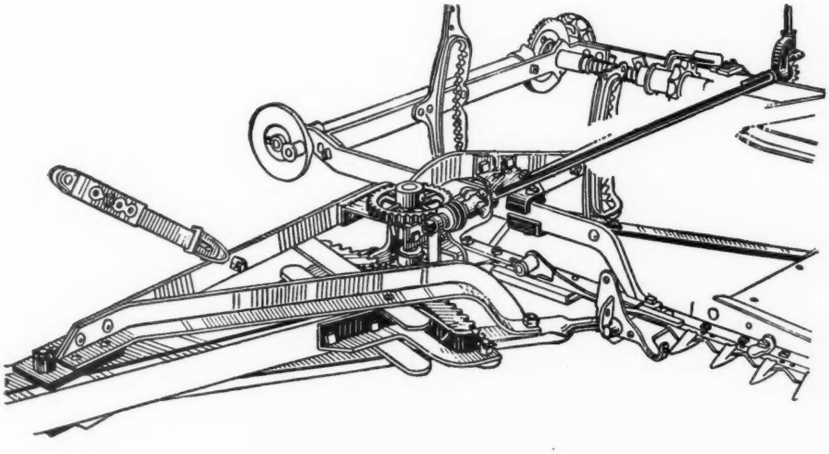
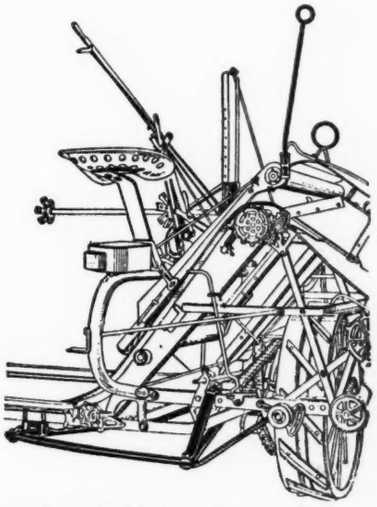


Fig. 8—McCormick stub tongue tractor hitch for one binder alone, showing clevis on stub tongue

do with the power developed by the tractor and has only a bearing upon how much of the drawbar pull can be utilized for real work. That is, the point of hitch has considerable to do with the amount of drawbar pull utilized. A study of the diagram in Fig. 1 makes it apparent that if the drawbar is hitched too low too much weight will be thrown upon the front wheels. On the other hand, if the drawbar is hitched too high the front end of the rig will be pulled off the ground and it will make it a difficult job to steer. Yet there are successful tractors of high build, as will be shown later.

In other words, an underslung hitch tends to stabilize the machine by shifting the weight forward and thus restoring the balance which is lost by the backward shifting of the center of gravity due to the reaction of the driving torque. A hitch above the center of the rear axle has exactly the opposite effect and still further unbalances the machine. This makes it necessary





Left, Fig. 9—Front view of Deering steering tongue tractor hitch used on the second grain binder of two. It is easily operated. Right, Fig. 10—Rear view of the first of two Deering binders, showing the portion of the Deering steering tongue tractor hitch which is placed on the rear of the first binder. The first binder must be drawn by a Deering stub tongue tractor hitch, except when pulled by a tractor larger than 10-20 hp.

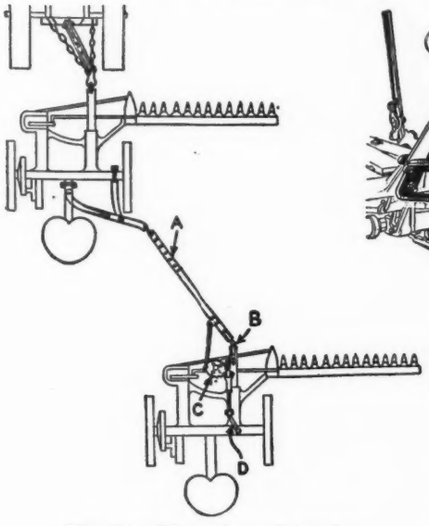


Fig. 11—Plan view of tractor hitch for pulling two or more mowers. A, Adjustable tongue connection; B, flexible joint; C, steering quadrant; D, steering crank

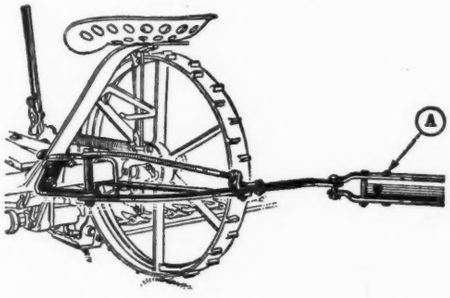


Fig. 12—Rear view of first mower showing that portion of the steering tongue tractor hitch for mowers which is placed on the rear of the first mower. The first mower must be drawn by a stub tongue tractor hitch for mowers except when pulled by a tractor larger than 10-20 hp.

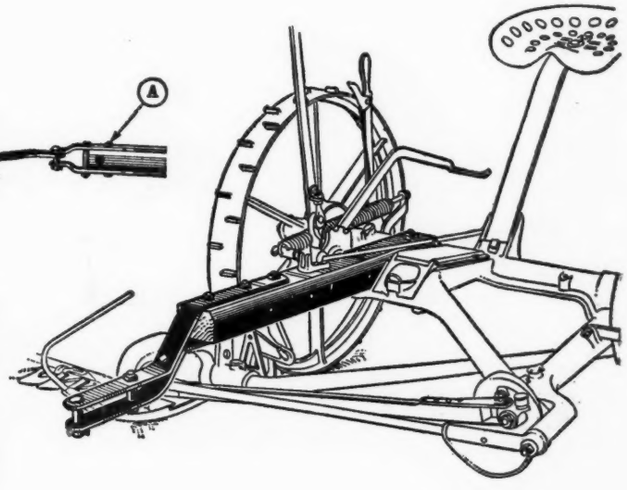
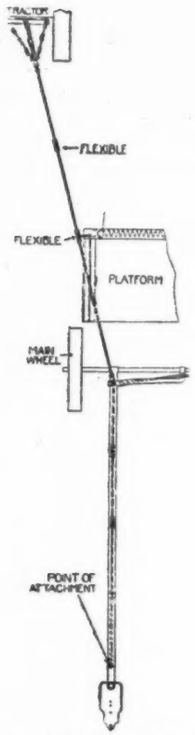
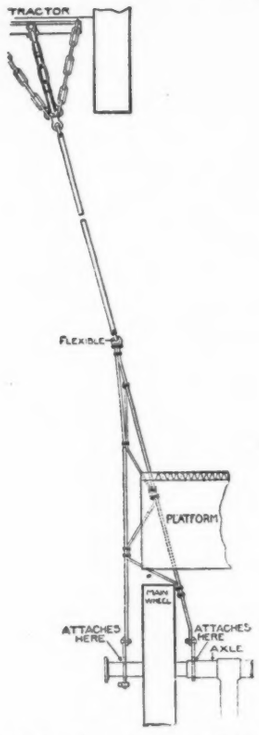


Fig. 13—Stub tongue tractor hitch showing clevis for attaching mower to tractor drawbar





Left, Fig. 14—*Plan view of Deering tractor hitch for push machines. Right, Fig.* 15—*Plan view of McCormick tractor hitch for push machines*

to place an improper proportion of weight on the front wheels, unless some other provision is made to take care of this shift. Thus the hitch can be made to counteract the tendency of the tractor to "rear" and lose its steering grip.

The ideal condition for a tractor hitch is reached when the weight on the rear wheel is as great as possible, while the weight on the front wheels is just sufficient to give efficient steering. In any wheel type of tractor the rear wheel load is the factor which determines the maximum amount of tractive effort possible. The front-wheel load only governs the reliability of the steering. Therefore, if only the proper weight is allowed to secure steering and all of the remainder of the weight is placed upon the rear wheels, most efficient results will be obtained. The nature of the load will also make a material difference in the proper height of the hitch above the ground, and although the S. A. E. has standardized a height of 17½ in. it will be found necessary to apply an adjustable drawbar which may carry the load as low as 12 in. from the ground, or up as high as 36 in. or more.

Location of Hitch

Some of the tractor manufacturing concerns have entirely different ideas on the location of the hitch than those usually employed. One concern states that the proper place to attach a plow hitch to the tractor is not at the back end of the frame, as it is impossible to get a maximum efficiency when the hitch is thus located, unless it be on a heavy tractor on which two-thirds of the weight is concentrated over the rear axle. The hitch on the drawbar of this tractor is considerably above the rear axle, so that the tractor automatically transfers weight from the front axle to the rear axle in proportion to the pull. That is, the lifting effect produced on the front axle is deliberately taken advantage of in order to secure a maximum pressure between the driving wheels and the ground. The hitch used in this tractor is illustrated in Fig. 2.

The importance of side draft is frequently overlooked. The drawbar should be adjustable so that the center of the load may be made to coincide with center of pull, in order that the utmost efficiency of the tractor may be secured. If the two center lines do not coincide the tractive power of one of the driving wheels is not fully utilized. On a three-plow machine, for instance, the drawbar should be set at 21 in. from the side of the furrow, while with two plows it would be set at 14 in. therefrom. It is quite easy to see what happens if this is not done, as the weight, being unevenly applied, would tend to swing the tractor around so that it would be following a line which does not coincide with that of travel.

Lessening Effect of Side Draft

The effect of side draft is often eliminated or lessened by pivoting the hitch from 12 to 36 in. in front of the rear axle, depending upon the size of the machine and its construction. This lessens the tendency to slow the rear end and also obviates the bad effects of side draft upon steering. There are other points to be considered in attaching the tractor hitch directly to the rear frame, which are brought out diagrammatically in Fig. 3. In series 1, A, B and C, the tractor hitch is inside the rear end of the tractor frame, while in series 2 the hitch is on the outside at the extreme rear. The sketches A in series 1 and 2 show the relative effects of the two types of attachment on steering. In series 1 the resistance to turning is considerably less than in series 2. Furthermore, the effects of rough ground are not nearly so apparent with the hitch ahead of the rear end of the frame, as will be shown in sketch C. When the tractor travels over very rough ground with a great number of sharp rises and drops there is an additional advantage in having the hitch point considerably forward, as it tends to hold the front wheels on the ground and to secure reliable steering.

To give a practical example of the effect of the tractor hitch the following figures may be of interest:

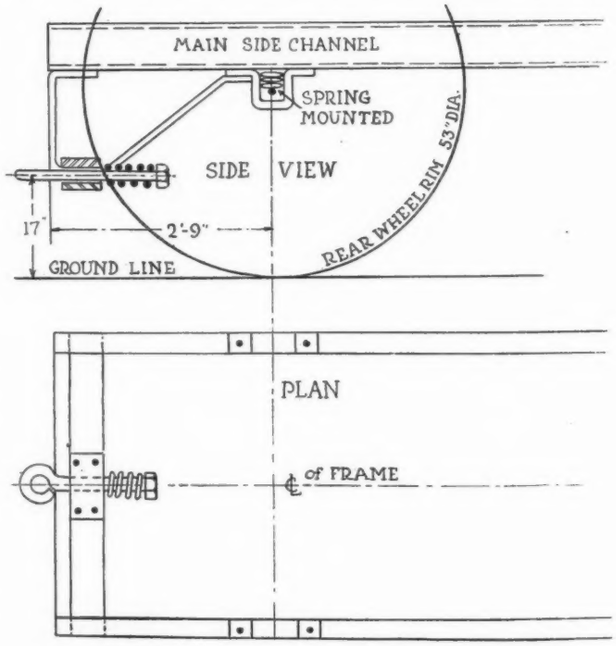


Fig. 16—*Sketch showing arrangement of drawbar on the Russell* 12-24 *and* 15-30 *tractors*

This tractor has a weight on the front wheels, when stationary, of 2100 lb. When the tractor is pulling 5000 lb. it has an uplift on the front wheels of 970 lb. The net weight on the front wheels when the tractor pulls 5000 lb. is therefore 1130 lb. The weight on the rear wheels when the tractor is at rest is 8200 lb., and, therefore, the weight transferred from the front when the tractor is pulling 5000 lb. is 970 lb., giving a total weight on the driving wheel of 9170 lb. Another practical example cited by a tractor concern follows:

In a modern, well designed, light weight tractor of the four-wheel type, the weight will be approximately 150 lb. per brake horsepower of the motor at full load rating. The maximum drawbar horsepower would be approximately 70 per cent to 75 per cent of the maximum power developed by the motor when running at its proper speed. Assuming a weight of 150 lb. per brake horsepower, a tractor having a motor capable of developing 25 brake horsepower would weigh approximately 3750 lb.

Propulsive Power Greater Than Drawbar Power

If the mechanical efficiency was 70 per cent at the drawbar the drawbar horsepower would be 17½. At 2 miles per hour the maximum drawbar pull would be 3275 lb. In other words, this tractor would be capable of exerting a drawbar pull equal to 87½ per cent of its own weight. It is obvious that the power required to propel the tractor and pull the load is greater than the drawbar horsepower, which is only a measure of the power required to pull the load. This increased power must be delivered to the drive wheel, and if we assume the transmission losses to be about 12 per cent the horsepower at the rim of the drive wheel would be 88 per cent of the maximum motor power, or 17 per cent greater than the drawbar power. When delivering this power to the drive wheel gears the pinion tends to climb upward and to raise the front end of the tractor off the ground. If we let R equal the radius of the drive wheel in feet, the up-turning moments in foot pounds would be:

$$\frac{25 \times .88 \times 33{,}000 \times R}{176}$$

This up-turning moment must be overcome, otherwise the front end of the tractor would not stay on the ground. There are two forces which act against this up-turning force; one is the drawbar pull, and the other the weight of the front end of the tractor. The moment in foot-pounds of the drawbar reaction is the drawbar pull in pounds times the distance in feet from the center of the rear axle down to the point of hitch. The moment in foot-pounds of the front end weight reaction is the front end weight times the distance between the wheel centers in feet. It will be seen, therefore, that if the weight distribution of the machine cannot be changed the only variable we have is the distance between the rear axle and the point of hitch. The greater this distance is, or the nearer the ground the point of hitch is, the lighter the weight on the front end of the tractor can be, or the greater the drawbar pull could be for a given weight distribution. There must be at all times enough weight at the front end to be able to properly steer the tractor when working under full load, and on a maximum grade of, say, 20 per cent. In designing a tractor the weight distribution should be figured for pulling both on the level ground and on a maximum grade to see which case governs.

Tractor manufacturers cannot hastily choose a hitching point; they must consider the most suitable hitch location for the implement to be used. It, therefore, seems necessary to have an adjustable hitching point in order to handle a variety of implements most successfully. For clearance, the minimum height of hitch should be about 12 in. above ground, and the maximum height of hitch should be about 18 in., giving a vertical adjustment of 6 in. Sideways adjustment is also necessary and should be at least 6 in. to 8 in. each way from the center line of the tractor. If a tractor is properly designed the drawbar pull and hitching points will be the first things considered.

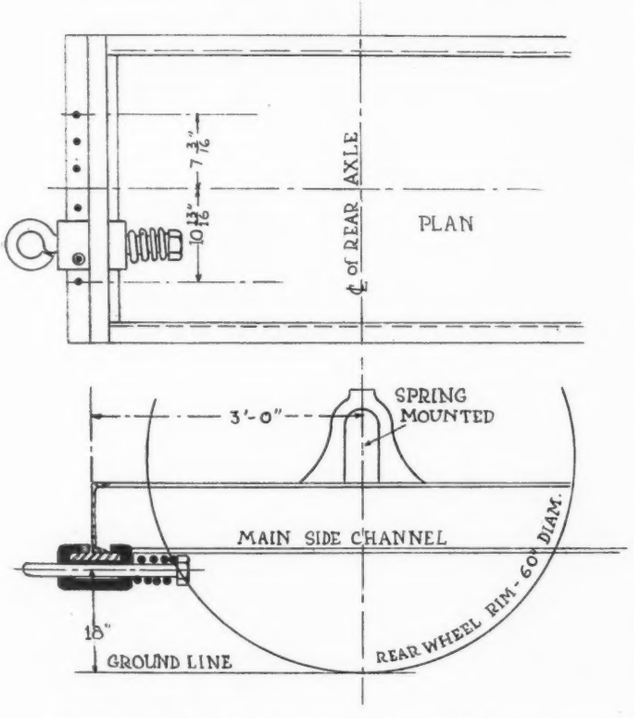


Fig. 17—Sketch showing arrangement of drawbar on the Russell 20-40 tractor

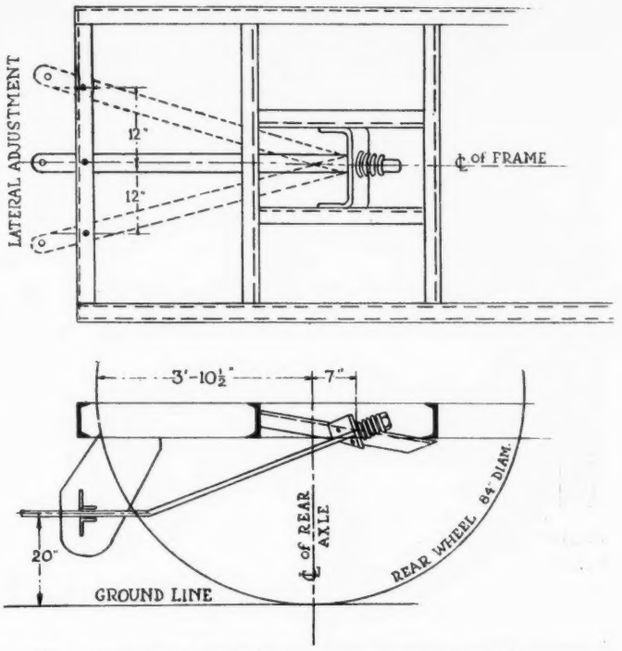


Fig. 18—Sketch showing arrangement of drawbar on the Russell 30-60 tractor

Quantity Production of Sheet Metal Bodies—II

How the Frames and Panels Are Assembled Into Completed Bodies—Inspection of Mechanical Details—The Work of Finishing from the Sprayed-On Priming Coat to the Final Coat of Varnish

By J. Edward Schipper

(CONCLUDED*)

NOW that the various parts of the body have been manufactured, the bringing together in the assembly processes will be considered. Not all the bodies manufactured in the Fisher shops are completely assembled. For instance, the Ford bodies are shipped knocked down to the assembling stations throughout the country. A complete set of parts of a Ford body as shipped is shown in Fig. 19. As will be noted, the side members have been assembled partially, so that in all there are five pieces, the back, the two complete side members, including the doors, the front part of the body, and the cowl member.

By the knock-down arrangement of shipping the Ford bodies, it is possible to ship a great number of bodies in one car. This will be readily perceived from Fig. 18, which shows a number of racks containing panels of Ford touring bodies. Were these bodies assembled they would take up considerable space, but in this way they nest into place requiring but little room. The panels previous to shipment are assembled over jigs, the metal work slipping over the wood skeleton by means of its flanges, and then being drilled as shown in Fig. 29. The screws are then put in, the doors fitted, and the panel is complete.

In assembling the larger bodies a great many more steps are necessary, as complete assembly must be carried out before shipment. When the welding processes are finished the sheet-metal units are dressed off with an emery wheel, as shown in Fig. 21, and finally with a buffing wheel. Where necessary they are hand-filed, and finally smoothed, so that the joint has just as good a surface as any other part of the plate. The hand-filing operation is shown in Fig. 22. This is necessary in order that in the after-finishing jobs a smooth, fair contour will be preserved in all parts of the body.

The final assembly work is just the same for these larger bodies as already described and illustrated for the Ford. The wood frame, after its complete assembly, is ready to take these metal parts, which slip directly over the frame and are then held in place by screws

*EDITOR'S NOTE—*In the first part of this article, which appeared in the June 20 issue—the War Engineering number—of* AUTOMOTIVE INDUSTRIES, *the author described the preliminary steps in the manufacturing processes which have been adopted by the Fisher Body Company of Detroit, whose output in 1917 was nearly 500,000 bodies. He showed how the work is carried from the first drawings on aluminum sheets through the woodworking department, where the framing is turned out, and the various metal stamping, riveting and welding departments where the panels are shaped and put together. In this, the final installment of the article, the author shows how the assembling and finishing are done.*

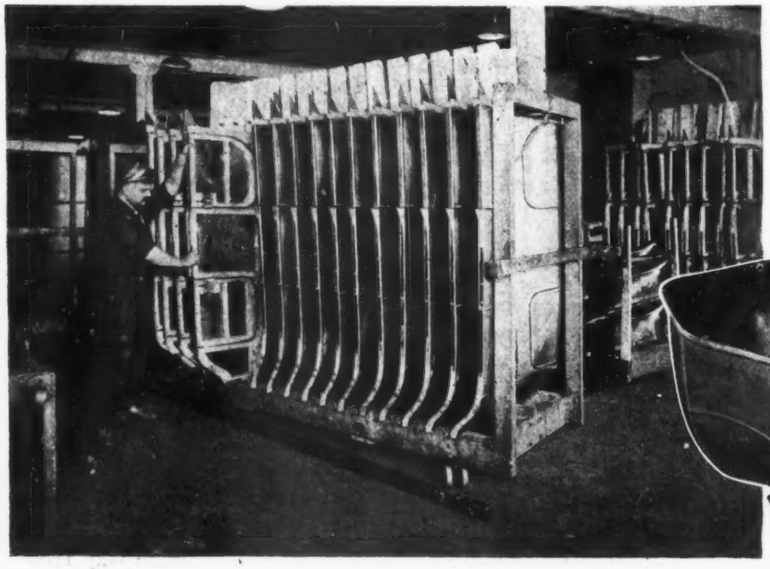


Fig. 18—Racks of panels for Ford touring bodies ready for shipment

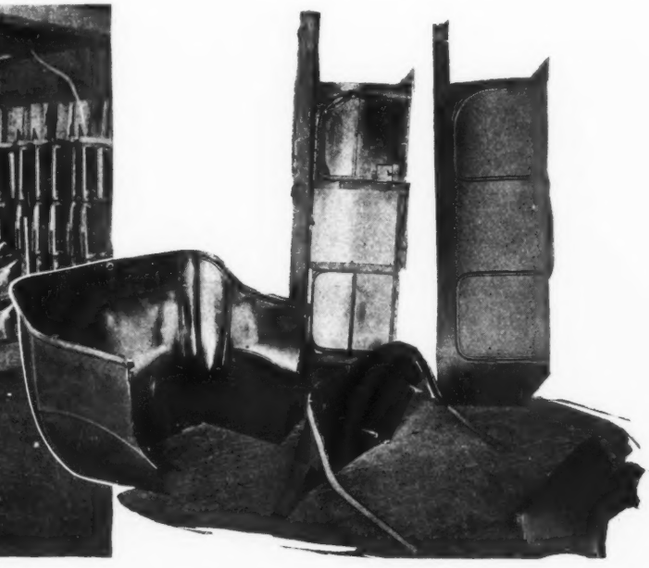


Fig. 19—Complete set of parts for Ford body, as shipped

Fig. 20—Jigs for assembling Ford panels and doors, showing operation of assembling over jigs

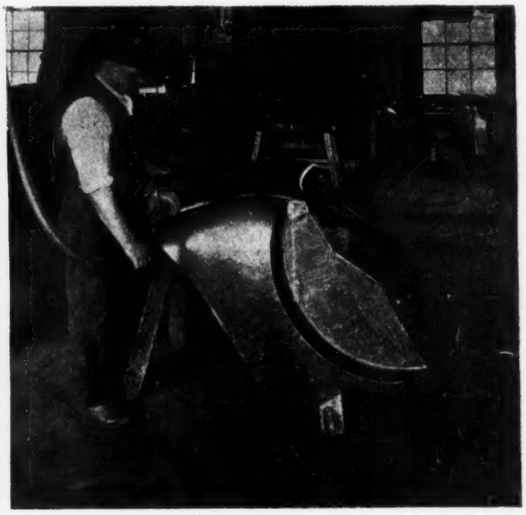


Fig. 21—Grinding off body plate to secure a smooth finish along welded seam

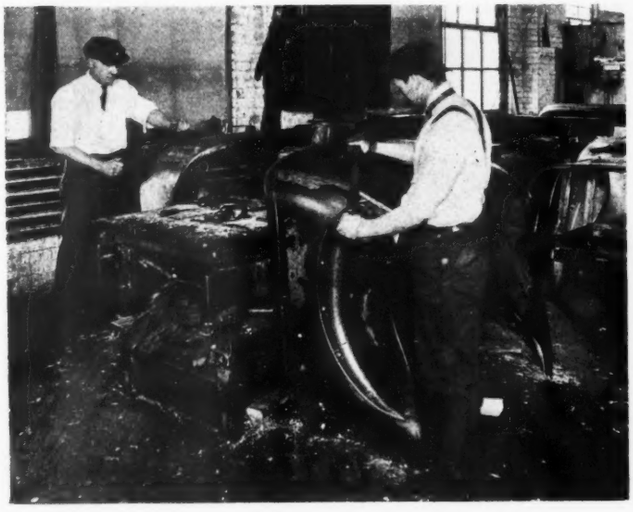


Fig. 22—Filing off the corners where the weld has been made to secure a smooth finish

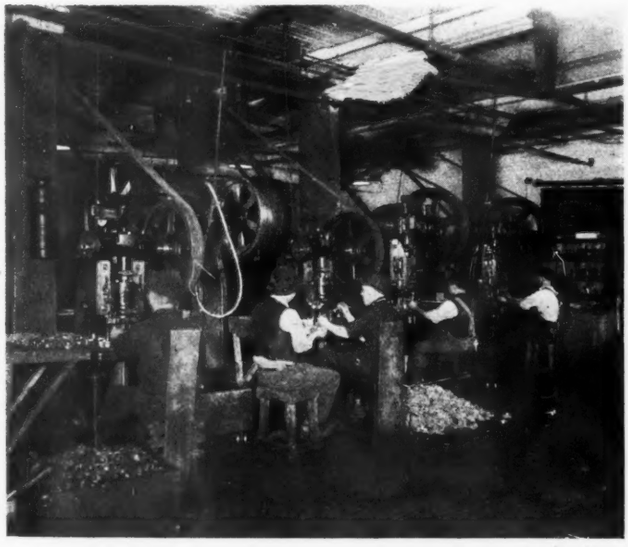


Fig. 23—Hardware department, showing the multi-operation dies in action making small parts

through the flanges. The body hardware is then put on, and it is interesting to note that a large part of this is made directly in the Fisher shops. For instance, the windshields, door handles, locks, etc., all form a separate department, which is a big factory in itself. Some of the pieces of body hardware are intricate stampings requiring exceptionally complex dies. A set of these small stamping machines for miscellaneous pieces of body hardware, such as hinges and locks, is shown in Fig. 23.

The windshield department is also a tremendous undertaking in itself, these parts being turned out complete in the department illustrated in Figs. 24 and 25. The side members are cut to length on the machines shown in Fig. 24, and the joints welded by acetylene torches. After these fittings are placed on the body the bodies in some instances are shipped to a trimming establishment, where they are finished up for the car manufacturer. It is general practice in the Fisher factory to send the touring bodies to a separate concern, such as the Briggs Mfg. Co., for trimming. It is a customary sight in Detroit to see huge trucks carrying ten or more bodies at a time, as shown in Fig. 26, making their way between one of the Fisher plants and the trimming establishment.

Trimming and Painting

While the open bodies are sent away for trimming the closed bodies are carried through to completion by the Fisher Body Corp. The processes of manufacture of the body are identical with those described for the touring cars. The wood framework is sawed to shape, assembled in jigs, in which it is clamped, screwed together and then sheathed with the metal paneling stamped out and welded together exactly in the same way as for the open bodies. After completion they are turned over to the closed body department.

Taking, for instance, a Cadillac sedan, coupe or limousine, the workmanship and finish put on these bodies are not surpassed in any custom built shop in the world. The foremen of these departments have been in touch with the latest developments in this country and abroad, and the only difference between these and the bodies turned out by the finest custom shops of Europe or America is that the owner of the latter may be in possession of a body of which the exterior shape may differ from any other body in use.

Views Illustrating Progressive Operations in

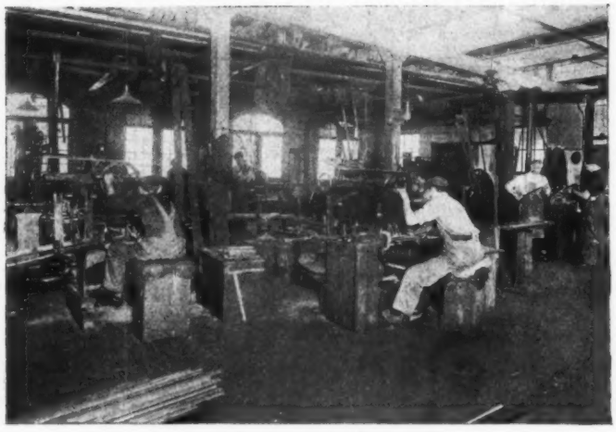


Fig. 24—Windshield department, showing the metal members of the windshield frame being cut to length

Fig. 25—Assembling the windshield frame members manufactured in the body hardware department

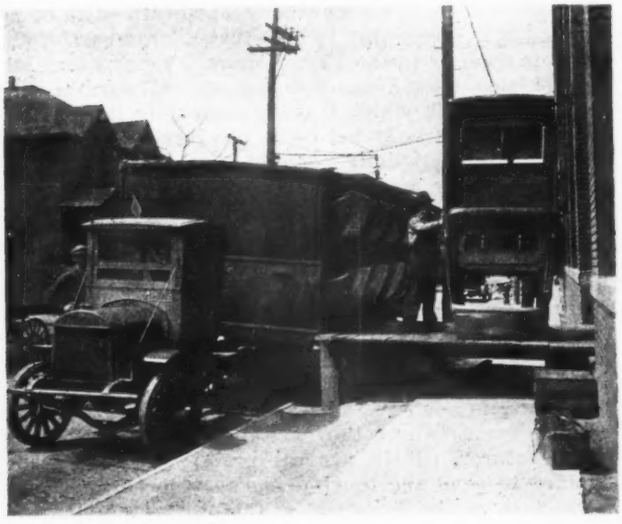


Fig. 26—Shipping Hudson touring bodies. These bodies are delivered in the raw metal

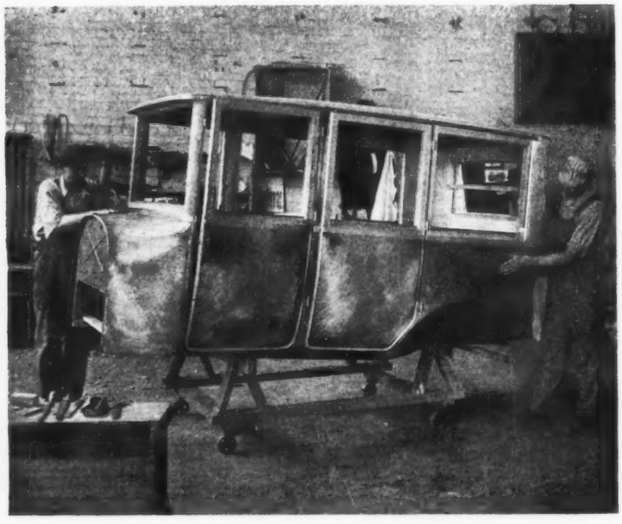


Fig. 27—Inspector at work looking over raw closed bodies for defects before painting and trimming

Fig. 28—Spraying on the lead. The operator stands outside and the spray is exhausted through ventilators in the rear

Fig. 29—Kiln drying the lead. This operation formerly took 48 hr. It is now done in 5 hr. at a temperature of 110 deg.

Building and Painting Car Bodies in Fisher Plant

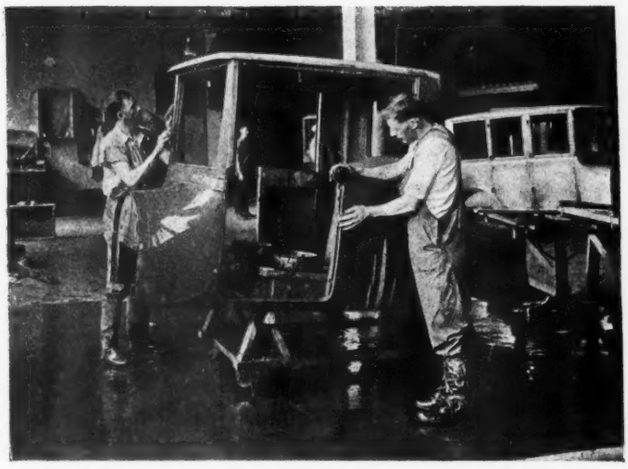


Fig. 30—Rubbing down one of the rough stuff coats. These operations are repeated until smooth

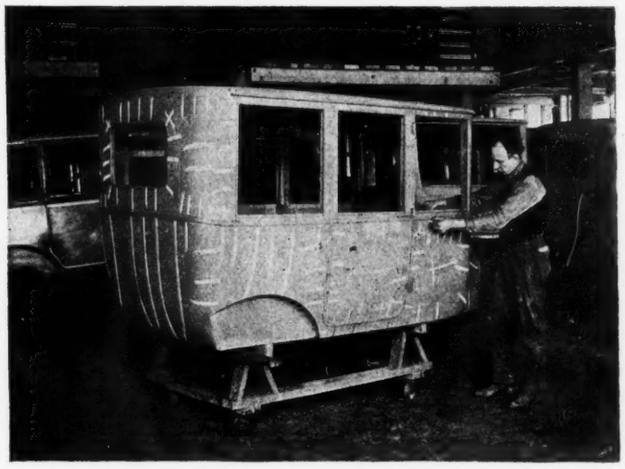


Fig. 31—Chalk inspection method to locate depressions in the body surface by application of chalk

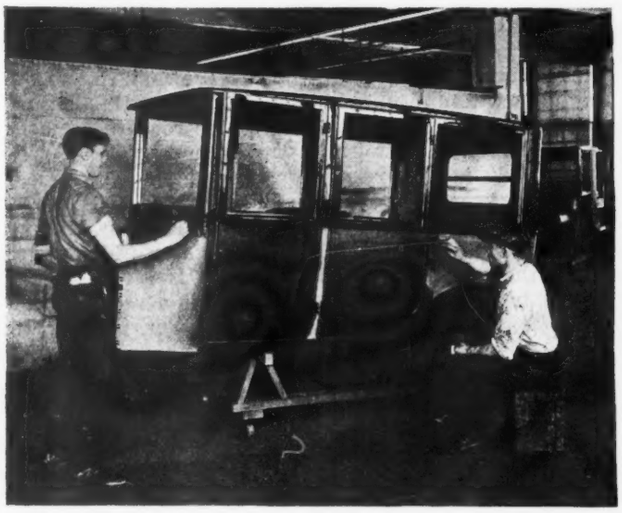


Fig. 32—Applying the first coat of color to the lower part of the body

Fig. 33—Applying coat of color to panels. This is the first of the color coats

Fig. 34—Rubbing down the color varnish coat preparatory to application of the final finish

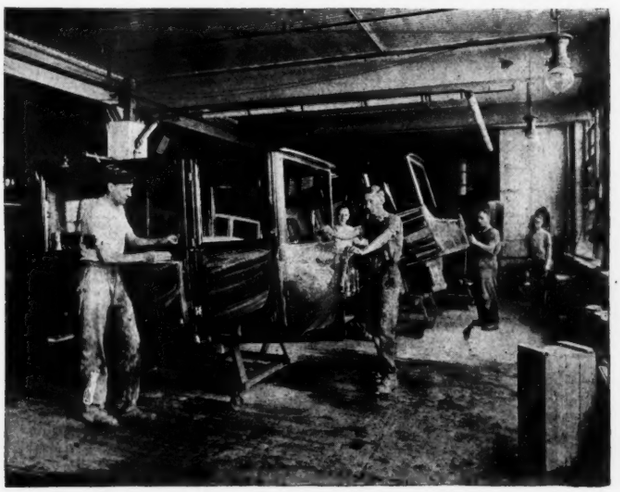


Fig. 35—Final rubbing down with pumice preparatory to the application of the last coat

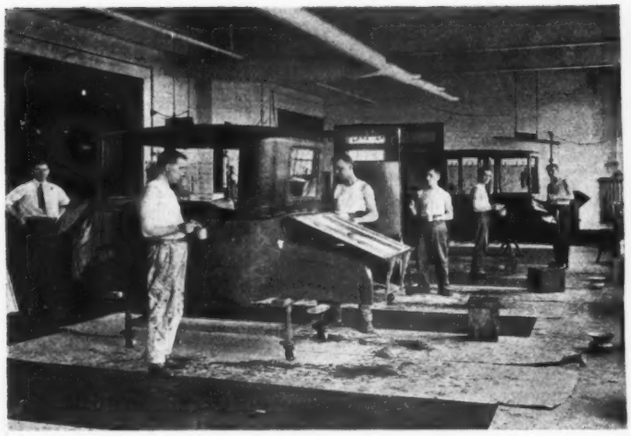


Fig. 36—Application of final coat of varnish in dust-proof room

Fig. 37—Flashlight taken in dust-proof dark room where final coat is dried

As far as workmanship is concerned, all the advantage of the highest standards is secured, and in addition the advantage which comes from the standard processes of manufacture common to quantity production.

Upon receipt of the body from the manufacturing department the entire job is thoroughly checked over by inspectors, who know where to look for defects. Fig. 27 shows the inspectors at work on a body which has just come from the manufacturing departments.

After the body has been passed as satisfactory by the inspectors it is given a chemical cleaning. Here chemicals which remove the oxides and dirt are applied with a brush, giving a clean, flat surface to work upon.

After the body paneling has been chemically cleaned the carrier is rolled into a spraying booth and the priming coat sprayed on. This coat of priming paint is the foundation for all the future painting operations. It fills the irregular and microscopically rough surfaces of the metal, giving the proper kind of a surface foundation to carry the color coats later applied, and to provide a firm juncture between these color coats and the metal. The operation of spraying on the priming coat is but the work of a few minutes with the air brush, and the coat quickly dries, after which a coat of lead paint is sprayed on, Fig. 28, in the same sort of sheet-metal booth. Exhaust fans remove the mist of paint from these booths, thus preserving the health of the operators.

After the lead coat is applied the bodies are rolled into a drying kiln, side by side, as shown in Fig. 29. Here under a dry heat the lead coat is fixed in 5 hr. It used to take 48 hr. to do this same work, but by means of the kiln in which a temperature of 110 deg. is maintained, and all the surplus moisture extracted from the air, it has been possible to shorten the time.

The lead coat is one of the first steps toward securing a smooth finish over the entire body. It cannot do this perfectly, however, because there are little depressions where screws have been put into place and where the metal has been depressed below the running surface for other reasons, and these must be made flush with the surface of the body also. To do this a coat of putty glaze is employed to fill in the hollow spots. These are scraped off even, so that a perfectly smooth surface will be had when the body is finished.

A final check is given on the smoothness of the surface by means of coats of rough stuff acting as guide coats and by chalk inspection methods. The rough stuff coats are applied over the entire body and then rubbed off flush, Fig. 30, to fill any unevenness in the surface. It is simply a smoothing coat and has no function as a part of the final color. As another check on the smoothness of the surface the chalk test is given. The flat side of the chalk is drawn lightly over the surface and if any depressions exist, or there are any bumps in the surface, they are indicated by the fact that the chalk will not take on part of the surface, or it might take more heavily in one place than in another. Any defects found in this way are filled with the putty glaze, and the surface brought to the required smoothness. The chalk test is illustrated in Fig. 31.

The body is now ready for the coats which give it its final color. The top of the closed car is given a coat of jet black, while the lower part of the body receives its first coat of color, Fig. 32. After these have dried, which they do very quickly, the top is given its first coat of black varnish. This varnish is a very brilliant black containing asphaltum. The lower part of the body is given a coat of color paint, as shown in Fig. 33. These coats are then allowed to dry, and a coat of color varnish is then applied to the panels or lower part of the body. This completes the primary finish and is the foundation work for the final body surface. This preliminary surface is rubbed to a perfect smoothness with pumice, Fig. 34, leaving the surface in a condition to receive the final finish. The top is then given another coat of black varnish, while the lower part of the body receives another coat of the color varnish, after which, in the quality of work such as is given the Cadillac closed cars which are shown in the illustration, another rubbing is given. The application of the black varnish for the top and the color varnish in successive coats gives the surface the depth and durability which could not be secured by single coats alone. The final rubbing is shown in Fig. 35.

The final varnish coat is applied in a dust-proof room, in which the air is thoroughly cleansed to remove all particles of impurity, or lint, and as soon as the coats are completed for the panels and top the bodies are rolled into a dust-proof dark room to dry for 48 hr. Fig. 36 shows the dust-proof light room in which the final coats of varnish are given, and Fig. 37 is a flashlight taken in the dark room where the bodies are having their final drying.

It will be noted from the illustration that the trimming work is put on just before the final coats. In Fig. 34, where the bodies are receiving their first rub, the trimming is not in place. In Fig. 35, where they are receiving their last rub, the trimming and interior fitments are all installed.

Development of a Heavy Oil Engine for Trucks and Tractors*

A Comparison of the Performances of Throttling and Constant Pressure Engines with Regard to Fuel Economy—A Small Four-Cylinder Design

By C. E. Sargent

WHEN we realize that the compression in a gasoline engine must not exceed the critical pressure (and temperature) resulting in premature ignition, and that we must depend on an elaborate electric system to start the inflammation—although with a slightly longer piston the same result would be accomplished—it is not strange that a constant compression engine in which the fuel is introduced

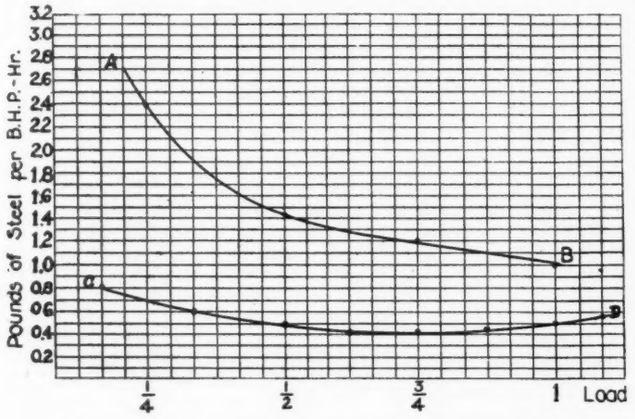


Fig. 1—Comparative fuel consumption curves. Curve AB, typical throttling engine; curve CD, constant compression Atlas-Diesel engine

into the extremely hot air after compression promises such possibilities in automotive applications.

In a constant compression engine there is *no* air throttling, consequently *no* back pressure or braking effect during part loads. There is *no* loss of power through a reduction of volumetric efficiency by heating the induced air. There is *no* loss in thermal efficiency due to reduction of the compression pressure during part (or average) load at which an automobile engine normally runs. Even when both types are developing full load the compression in the constant compression is about eight times that in the throttling type, and the thermal efficiency of the former is higher.

In a throttling engine the sudden rise in pressure due to premature or self-ignition, which causes the "ping" in automobile engines, may equal or exceed the compression in some constant-compression types. Therefore, the weight and strength of the working parts in the latter need not greatly exceed those of the gasoline engine in general use.

The fuel-consumption curves, Fig. 1, in which *A B* shows the average fuel consumed by a typical throttling engine using gasoline, and *C D* the fuel-consumption curve of engines of the constant compression type at once make evident the desirability of using the constant compression engine in the automotive field.

Fig. 2 is an ideal card for an engine of this type, in which the fuel injection is so timed that the pressure increases at the same rate at which the volume of burning mixture is increased by the moving piston, thus making the combustion line *E F* horizontal. The line *F G* is a mean between isothermal and adiabatic expansion. Such a diagram indicates

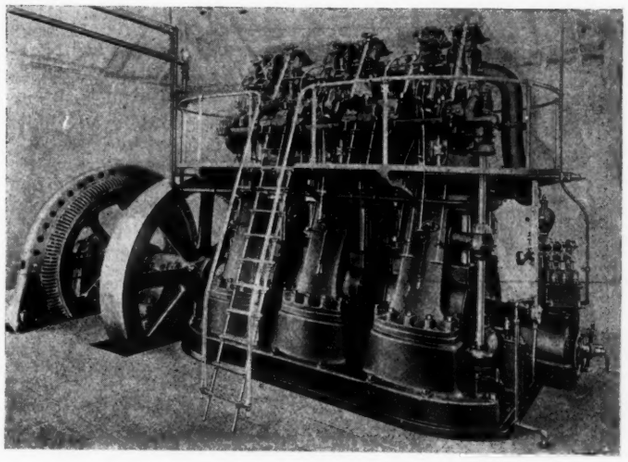


Fig. 3—Triple-cylinder 450-500 b.hp. Lyons-Atlas Diesel engine, vertical four-stroke cycle type direct-connected to 375-kw. alternator

a possible thermal efficiency of nearly 50 per cent, and if the mechanical efficiency were 100 per cent a horsepower hour would be developed on about one-quarter pound of fuel.

In order to secure an ideal diagram such as that in Fig. 2 the fuel injection would have to be perfectly timed and the fuel itself delivered to the combustion space by air having practically twice the pressure of compression, or approximately 1100 lb. per sq. in.

Air compressors, either direct connected or independently driven, are required to provide the injection air, and if this

*Abstract of paper read before the Society of Automotive Engineers at Dayton.

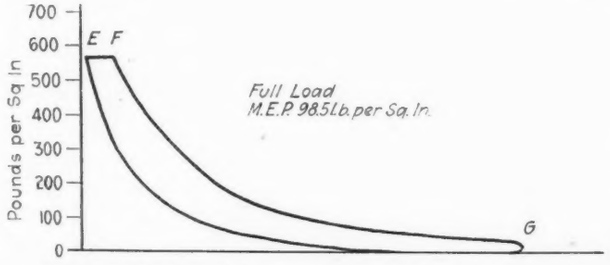
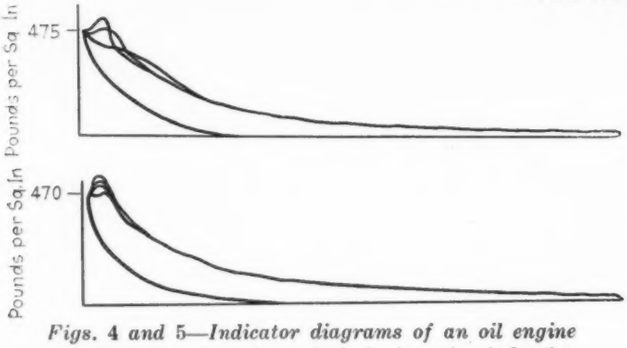


Fig. 2—Ideal indicator card for engine of constant compression type. Full load means effective pressure



Figs. 4 and 5—Indicator diagrams of an oil engine in which the fuel is sucked during the induction stroke

be used the power required to drive such compressors, the heat and friction losses due to handling the compressed air, and the mechanical friction in the engine itself, bring the net fuel consumption per hour down to from 0.45 to 0.50 lb. per b.hp. hr., a figure much lower than that for the average type of gasoline engine running under the same load.

Engines such as that shown in Fig. 3 are suitable for stationary or marine work, and are believed to be the most efficient prime mover extant. In large sizes they have no superior, on an efficiency basis, and may never be superseded by an engine of other types. However, on account of the difficulty of compressing and carrying air under such high pressure and of providing pumps that will measure and deliver almost infinitesimal globules of fuel to the combustion chamber, portable engines of this type are probably impracticable in small multi-cylinder units, such as are usually required in automotive applications.

Gravity Feed for Fuel

In order to eliminate the complicated mechanism indigenous to this type of heavy oil engine a method has been developed of sucking fuel during the induction stroke through a needle valve into a pocket separated from the main combustion chamber. While not absolutely perfect, this method is simple and gives commercially successful results. Diagrams from such an engine (Figs. 4 and 5) have the characteristics of the ideal diagram, Fig. 2, except that the firing line varies from stroke to stroke, giving a variable ignition pressure. The percentage of variation is no greater than in the spark-fired gasoline engine, and the mean effective pressure is as nearly constant.

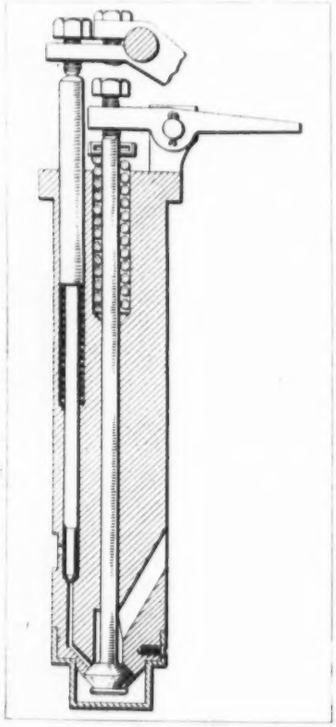


Fig. 6—Cross section through fuel plug, showing needle valve and fuel pocket

Fig. 6 shows a fuel plug, consisting of the fuel valve, needle valve and fuel pocket, for such an engine. In the ordinary automotive engine one simple device of this kind per cylinder supplants the carbureter, air stove, priming cocks, spark plugs, high-tension cables and magneto. In the mechanically-timed fuel injection, constant compression heavy oil engines the device supplants the fuel injection valves, governors, double extra strong piping, air bottles and triple expansion compressors. The desirability of so simple an engine in the automotive field is very apparent.

In order to obtain the highest thermal efficiency in a gasoline engine the time of ignition should be advanced in direct proportion to the engine speed and inversely with the compression pressure. This principle has been advocated by the author for several years, but has yet to be attained in practice because it involves the use of automatic and most intricate compensating mechanism.

In a constant-compression engine of the gravity-feed type described above, the manifold pressure is necessarily constant and the timing of the ignition varies automatically and directly with the speed of the piston, thus maintaining a practically constant thermal efficiency without auxiliary mechanism.

While no heat balances or fuel-consumption tests have, to the author's knowledge, been made of these comparatively small four-cylinder engines, Table I shows the fuel consumption per brake horsepower of a three-cylinder 9½ by 10½-in. stationary engine using different fuels. This indicates an efficiency seldom surpassed by engines of a greater output.

The load during all the tests was continuous, and fuel changes were made without stopping the engine or removing the load.

Starting

In order to crank an engine readily with 475-lb. compression it is necessary to relieve the compression until such a speed is reached that the inertia of the flywheel will carry the engine over one compression. If fuel is permitted to flow into the fuel cup during the induction strokes before compression begins, it may flow out by gravity into the combustion space, causing premature ignition.

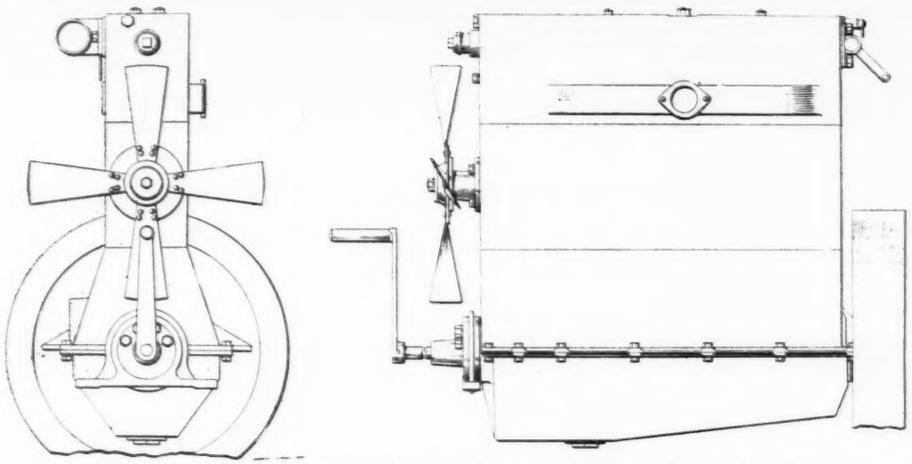
TABLE I—RESULTS OF TESTS OF THREE-CYLINDER HEAVY OIL ENGINE

Test No.	I	II	III	IV
Bore of cylinder, in	9½	9½	9½	9½
Stroke, in	10½	10½	10½	10½
Fuel	Kerosene	Mexican fuel oil	Standard Oil Co. fuel oil	Lansing fuel
Weight per gallon, lb	6.9375	7.1875	7.375	6.9375
Weight per pint, lb	0.8672	0.8984	0.922	0.8672
Gravity, deg. Baume	42	33	29	39
Flash open flame, deg. F	160	200	196	210
R.p.m.	315	330	345	340
Pounds pull net	191	191	191	191
Brake-arm circle circum., ft	33	33	33	33
Torque, lb.-ft	1003.3	1003.3	1003.3	1003.5
Horsepower	60.165	63.03	65.895	64.94
Fuel, lb. per b.hp. hr	0.586	0.500	0.481	0.466
Operation of engine	Smooth	Very smooth	Smooth	Smooth
Exhaust	Clear	Trace of smoke	Almost clear	Trace
Engine troubles	None	None	None	None
Maximum b.hp. with slight smoke	60.16	85.00	84.15	86.70

Figs. 7 and 8 show a four-cylinder complete expansion thermo-syphon-cooled engine now in process of building, designed for truck and tractor service. In this the fuel valves are closed by the same mechanism that holds the exhaust valves open, thus eliminating the probabilities of premature ignition when the engine is started. Fig. 9 shows a cross section through No. 1 cylinder, the fuel valve, and one-half of the air admission valve, and Fig. 10 a longitudinal section through the center of the engine.

While this engine can be cranked much more easily than a gasoline engine of the same piston displacement, provision is made for the application of both an electric starter and generator.

The overhead camshaft works on the valves direct, turning each a few degrees every opening. The camshaft is driven by two pairs of bevel gears and the fan by one pair from the vertical shaft. The force-feed oil pump, doweled in the bottom of the lower crankcase, is driven by the gear on the crankshaft. This pump comes off with the lower case. Oil is delivered under pressure to the crankpins and main bearings and through the hollow camshaft to the upper parts of the valve mechanism. The cylinder head, containing valves, camshaft, governor mechanism and fuel valves, is removable;



Figs. 7 and 8—A four-cylinder complete expansion engine designed for truck and tractor service

its walls are carried above all moving parts so that plates cover all the mechanism, thus keeping the oil in and the dust out.

The inlet and outlet-water openings are shown dotted. The crankshaft is anchored at the front bearing, thus keeping the pitch circles of the driving gears in their proper location.

By rotating a semi-cylindrical cam 90 deg. by use of a lever just above the flywheel the camshaft is moved forward against the governor spring, causing the cones on the camshaft to hold the exhaust valves open and the cone on the governor to close all needle valves. The fuel is thus prevented from entering the cylinder until compression begins. During normal operation the flyballs move the governor cone against the spring in proportion to the speed, thereby proportioning the fuel supply to the load.

If in truck or traction installations the short arm—also above the flywheel, and fastened to the governor shaft—be so connected that when the clutch is moved to the neutral position the fuel is throttled, then the engine speed is automatically reduced to an idling speed when no work is being done. The air for the fuel valve is taken from the filtered air in the manifold, and the fuel is supplied to the needle valves through holes drilled in the cylinder head.

The friction-drive fan is of large diameter, and, with so little engine area in the path of the discharged air, ought to be highly efficient. With a fixed fan center, the radiator shroud, so essential in continuous and heavy work, need be but slightly larger than the fan, eliminating any back or eddy currents.

The lubricating oil, in flowing to pump suction, passes vertically through a gauze strainer, thus depositing foreign matter in the pocket below.

The fuel valve is opened on top center and remains open 180 deg. during the induction stroke. The exhaust valve opens 20 deg. before the end of the working stroke and closes on top center. The air valve opens on top center and stays open until the piston has traveled 1½ deg. on the compression stroke. The clearance is such that when the piston has traveled 5 in. on the compression stroke after the inlet valve is closed the pressure will have reached about 475 lb. absolute, when the fuel is automatically injected. The piston travels 20 per cent farther on the working stroke before release than it traveled during compression. While problems may arise requiring some changing of details, the simplicity of the design warrants its thorough development.

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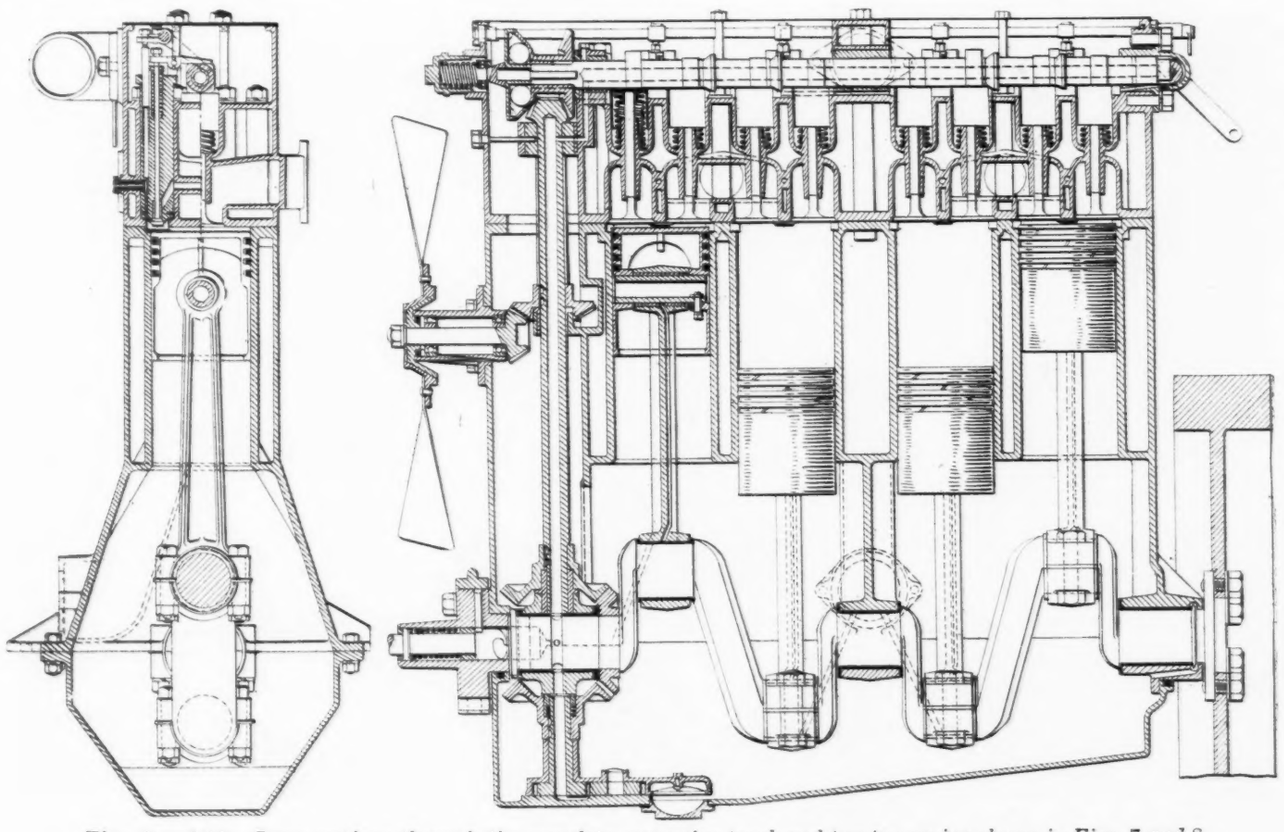

Figs. 9 and 10—Cross sections through the complete expansion truck and tractor engine shown in Figs. 7 and 8

Drop Forge Men in Convention

Flourishing Associations of Drop Forgers and Supply Men Hold Annual Meeting at Buffalo—Engineering Discussion, Visits to Local Plants and Entertainment Features Make Up Program

A WELL attended and well managed joint meeting was held at Buffalo June 20 to 22 by the American Drop Forge Association and the Drop Forge Supply Association, which organizations are working harmoniously together. It was the fifth annual convention of the Drop Forge Association and exceeded every one of its predecessors in point of attendance. The headquarters for the meetings were at the Hotel Iroquois and the sessions were held in the convention hall of that hotel. The Drop Forge Association has been growing rapidly. A membership list circulated at the meeting contained the names of seventy-seven member companies; more were taken in during the meeting and it was announced that upward of 80 per cent of all the hammers in the country are now represented in the association.

At the present time the drop forging concerns are to a large extent engaged on war work. They make forgings for airplanes, motor trucks, tractors, gun mounts, shells, etc. All are working at a high pressure and helping the Government in its war preparations in every possible way. Early last year, when it seemed certain that the United States would become involved in the war, the association was somewhat in doubt as to the expediency of holding its regular annual meeting; the subject was discussed pro and con, but the meeting which was eventually held at Cleveland proved to be the best attended in the history of the society up to that time.

Mayor Buck of Buffalo welcomed the association to his city, pointing out its advantages from an industrial standpoint. The meeting was presided over by R. T. Herdegen, of the Dominion Forge & Stamping Co., Walkerville, Ont., who headed the association during the past year. A strong bid for next year's convention was made by the city of Pittsburgh, an invitation from the mayor of the city and an endorsement of same by the Chamber of Commerce being read at the meeting.

The first technical paper to be read at the morning session on Thursday was on "Powdered Fuel for Drop Forge Furnaces," by H. D. Savage, vice-president of the Locomotive Pulverized Fuel Co. Mr. Savage in his paper made the statement that coal finely pulverized and held in suspension while being burned produces heat cheaper than any other fuel except natural gas, and it is a wonder why it has not been used so far in the metallurgical industries. The installation of devices for burning powdered coal calls for expert work. It can be used to greatest advantage in large installations, and in such an economy of from 30 to 60 per cent can be effected as compared with the use of oil or other available fuels. The use of powdered coal in metallurgical work is of advantage especially from the viewpoint of the sulphur contained, which when the coal is burned in this form has some fuel value, and passes off with the exhaust.

A question was asked Mr. Savage as to whether the problem of ashes deposited on the work being heated had been fully solved. He replied to this that if the installation was

Group photograph of members and guests at the Fifth Annual Convention of the American Drop Forge Association

correctly designed there would be only very slight deposits of ash, as most of the incombustible material would pass off with the exhaust gases. The slag that is formed by soft coal makes a slight scale on the furnace walls, but the hearth clears itself. With powdered coal the exhaust gases cannot be exhausted into the shop but must be carried off through flues. The better the grade of coal burned the better will be the results, but any kind of coal can be burned, and such poor grades as anthracite sludge, Rhode Island anthracite, lignites and Illinois and Indiana screenings have been successfully used in heating boilers.

One of the plants in the East equipped with furnaces for burning powdered coal is that of the American Locomotive Co. at Schenectady, N. Y., which is equipped with these furnaces exclusively, for which it is claimed that they can burn the poorest coal that can be obtained. There is a stack on every furnace, and forced draft is used. The Timken Axle Co. of Detroit had installed powdered coal furnaces, and a representative of the company present was asked to relate their experience, but he said that they had had them in use hardly long enough to form a fair opinion. The men had complained of too much dust from the furnaces, and they had to take them out. It was stated that the American Locomotive Co. at first had experienced the same trouble, that it was impossible to confine the fine dust to the furnace, but in the new type of furnace with mechanical draft this had been overcome.

Another member who had had considerable experience with a powdered coal furnace stated that by this means it was possible to heat the work through quicker and get it into a softer state than by the use of any other fuel. The flue from each furnace was connected to a large flue running lengthwise of the shop with a large Sturtevant fan at each end. There was no trouble from dust. The only trouble experienced was that the coal feeding pipe occasionally became choked where it delivered into the manifold or distributor. The flame could be nicely regulated by means of a screw, one-sixteenth turn of which showed a very noticeable effect.

Figuring Die Cost

S. A. Keller of the Keller Mechanical Engraving Co. presented a paper on "Cost Figuring of Drop Forge Dies," in which he made a strong plea for more thoroughly itemizing the expenses connected with the production of dies. Almost every item of cost that enters into the production of drop forgings, including fuel, materials and labor, is increasing in cost, and accurate bookkeeping is essential. It is surprising that drop forge concerns are often quite ignorant regarding the cost of their dies. Many items of direct cost are supposed to be included in overhead. In the past the attitude of the drop forger toward the customer with regard to dies was often apologetic, which is not at all as it should be. All die costs should be accurately kept and carefully apportioned over individual jobs. Skilled die sinkers should be used only where absolutely required, and all other work should be done by less expensive labor. The speaker's concern in estimating for dies makes use of a blank form which has proven very useful in that it has obviated overlooking certain items. The estimated cost under each heading is placed on this blank, from which it is transferred to the cost sheet. This permits later on of making a direct comparison between estimated and actual cost under any heading, and in case of an important discrepancy it is called to the attention of the estimator. Mr. Keller placed emphasis on the importance of giving complete detail instructions to the die sinker, as in this way much loss of time can be obviated.

Welfare Work

A quite lengthy and much appreciated talk on "Welfare Work in Forge Shops" was given by Edgar E. Adams of the Cleveland Hardware Co. Mr. Adams called attention to the timely importance of welfare work in industries in view of the labor situation. He said that it had been the custom in machine shops to look carefully at all equipment, but that little care had been given to the human machine until recent years. In speaking of our perfected automatic machinery he often made use of the term "almost human." "Almost human" was right, in that no piece of dead mechanism could ever quite equal the perfection of the human machine. The welfare movement was nothing more than a part of the general conservation movement. "What is the United States doing to-day?" asked Mr. Adams. It is doing more than building airplanes, guns and other mechanical equipment, its greatest task being the building up of the physique of its great army of men.

T. W. Siemon of the Union Switch & Signal Co. read a paper on "Should Forgings Be Sold Direct or Through Brokers?" in which he strongly favored the first mentioned method. There was no discussion of Mr. Siemon's paper, which led him to the conclusion that everybody agreed with him. A paper on "The Electrical System of the Forge Shop" was read by Edward McIlvried of the Champion Machine & Forging Co. Mr. McIlvried in his paper covered the use of electric motors for operating the hammers and other forge shop equipment, of electromagnets in handling material and of electric furnaces for heating steel for forging and for heat treatment. One of the chief advantages of the electric furnace is that the atmosphere is neutral and no scale is formed on the steel heated, whereby the dies are preserved.

Steels for Gears

G. A. Richardson of the Midvale Steel Co. read a lengthy paper on "Steels for Gears." Mr. Richardson enumerated the different requisites of steels for the manufacture of gears, including resistance to wear and resistance to shock. He also went to some extent into the design of gears and pointed out among other things that sharp corners should be avoided wherever possible. The larger the size of the gear the more difficult it is to heat treat it properly, and heat treating is also more difficult the better the grade of steel. However, larger and larger gears are being successfully heat treated, and Mr. Richardson mentioned bevel gear 86 3/16 in. diameter and weighing 13,350 lb. which had been successfully air hardened.

The first paper of the morning session on Friday, June 21, was on "Cost of Heating Steel," by B. K. Read, engineer of the Dominion Forge & Stamping Co. This concern during the past year has made determined efforts to reduce its fuel cost, and the results obtained were given in the form of tables and curves. It was pointed out that coal at present costs $90 a ton in Italy, $60 a ton in France, and its price is also rapidly rising in other countries, so that the best possible economy should be aimed at. In Canada, where the data were obtained, coal has gone up in price 180 per cent in three years, and crude oil 300 per cent. Central power stations have long been closely studying the problem of economizing fuel, but metallurgical establishments heretofore have paid little attention to the subject, because they felt the cost of improved equipment was not warranted by the results. To-day, however, conditions are such that investment in the necessary equipment to insure better fuel economy will pay.

Quenching Oils for Forgings

A representative of the E. F. Houghton Co. read a paper on "Quenching Oils for Forgings," by George W. Pressell, chief chemist of the company. It was brought out in the paper that the oil must have considerable heat conductivity, so as to insure rapid cooling of the steel. Besides, the oil must not undergo a chemical change at the high temperatures to which it is raised by the red hot steel. If the cooling medium volatilizes quickly, a coat of bubbles is formed on the steel which prevents rapid cooling. The quenching speed of any medium depends upon the refrigerating properties of that particular medium and also upon its viscosity. Most oils oxidize at the high temperatures to which they are raised by coming in contact with the red hot steel, with the result that a residuum is formed and the character of the oil is changed. According to the author, very satisfactory results are obtained with distilled wool grease, and figures were given to show that it did not appreciably deteriorate in years.

George C. Stebbins, superintendent of the Wyman & Gordon Co., gave a talk on the treatment of piston rods of steam hammers. It appears that the piston rod is one of the common sources of trouble in the drop forge industry. In the

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Protecting Key Industries

THE recommendation of the British Committee on Commercial and Industrial Policy After the War to regulate the imports of magnetos by license, under a customs duty of 33 1/3 per cent, with a possible complete prohibition, is of interest to our magneto manufacturers. During the early part of the war we built up quite an extensive business in magnetos in Great Britain, though since then the rapid development of the British magneto industry and the increasing demands for magnetos in our own country for trucks, tractors, motorcycles, etc., have caused this business to decline. No intimation is made as to how the granting of licenses is to be handled. If licenses are granted without regard to the origin of the magnetos the rather high duty is apt to hurt American manufacturers more than the German, for the Bosch magneto which held the field in England previous to the war never sold on price.

Another point which seems to be left open is in regard to battery ignition equipment. It is to be presumed that after the war the passenger car business will quickly develop again and the greatest demand for ignition equipment will be in connection with passenger cars. In view of what has been accomplished in this country it is to be expected that nearly all British after-the-war models will carry complete electric equipment and that there will be a strong tendency toward battery ignition. The magneto prohibition therefore will hardly be as restrictive as it may seem.

The Law of the Air Propeller

IT is unfortunate that there do not as yet exist reliable formulae for the thrust of an air propeller of given design and the horsepower absorbed by it at a given speed. Of course, satisfactory results are obtained from propellers developed experimentally, but it is obvious that if the characteristics of a propeller could be determined with accuracy from its design, much "cut and try" development work could be eliminated. The theory of the screw propeller as applied to marine work has been well developed by Rankine and others. However, there is this difference between a propeller working in water and one working in air that compressibility of the medium may be neglected in the former case and is, in fact, disregarded in the formulae. Obviously a general formula for screw propellers should contain constants for the density, the viscosity and the compressibility of the fluid in which the propeller works. A misconception seems to exist in the minds of some workers in this field to the effect that air and water differ widely in respect to elasticity. At least so far as stresses imposed upon them by propeller blades are concerned, both are perfectly elastic, and what is mistaken for elasticity is compressibility.

Morgan Brooks of Illinois University presented a paper on "Air Propulsion" at the recent meeting of the American Society of Mechanical Engineers, in which he introduced the term superspeed. He found that an anemometer placed in front of a stationary revolving propeller shows an air speed about 50 per cent greater than could possibly be expected from the pitch and speed of rotation under the screw action theory. Hence he concludes that this theory is inapplicable to air propellers.

Mr. Brooks thinks that the theory of batting action, according to which the air is thrown back from the advancing blade surface in such a direction as to make the angle of reflection equal to the angle of incidence, serves to explain the result observed by him.

The theory of the air propeller must be built up from that of a plane surface moving "straight air" through the air, and it is a well-established fact that the average speed imparted to the air displaced by such a surface is considerably greater than that of the plane itself. In fact, the air speed is usually taken as 41 per cent greater than the speed of the plane. Of course, the direction of motion of the air

is not the same as that of the plane. The air has to get around the edges of the plane and its motion at the moment of maximum speed has components perpendicular and parallel to the plane.

Unfortunately an anemometer is not a reliable instrument for measuring components of air currents. If the instrument is set with its axis at an angle to the direction of the current, it will not measure the component of the current in the direction in which it is set but a different and usually higher value. This may possibly explain some of the discrepancies between Mr. Brooks' observed results and theory.

Fuel Economy in Industrial Plants

AS our war preparations are progressing and all industrial plants producing war supplies are speeded up to their very limit, the demand for fuels and raw materials is surpassing all previous records. The result is a scarcity of all the essential materials, which is proving a great handicap to the industries. It has been attempted to control the situation by priority orders and similar measures. While these will insure that materials will first go where they are most needed from the viewpoint of the successful prosecution of the war, they will not eliminate the disproportion between supply and demand in such basic materials as coal and iron. That the situation with respect to coal and oil fuel is a serious one is apparent from recent reports on the subject. Production is evidently being carried on at the maximum possible rate and the only hope for relief seems to lie in the more economical use of fuel.

Central power stations, in whose cost of operation the coal bill is an important item, have given much attention in the past to methods and equipment tending to increase their efficiency of operation, but manufacturing concerns, in whose operating cost the outlay for fuel naturally figures less prominently, have not studied their coal and oil consuming equipment with equal care. It is only necessary to recall the heatless and powerless Mondays of last winter to bring home the fact that this is no time for wasting fuel. Every manufacturer should go over his power plant and eliminate all preventable losses. His firing methods may be wasteful or power may be lost by leaks in steam lines or excessive radiation. Machinery may be run unnecessarily or large power units may be operated at very small load and consequently very inefficiently. The time to eliminate these wasteful methods is now while fuel is still being supplied in liberal amount. If the matter should be neglected it may be necessary for the Government to again adopt radical measures, with most unpleasant effects on industry.

If every manufacturer uses the fuel allotted to him to the best advantage there is ground for the belief that our industries may be operated throughout the coming winter without restrictions due to lack of coal.

Eight-Cylinder Aircraft Engines

DESCRIPTIONS appeared in the English aviation papers during the past month of an eight-cylinder Mercedes aircraft engine, concerning the existence of which nothing was generally known previously. It is stated, however, that the type was almost immediately abandoned and is no longer made.

The eight-cylinder model seems to have represented the first step forward when the original 160-hp. six-cylinder engine no longer met the requirements of the aviation service with respect to power. It had the same cylinder dimensions as the 160, and, of course, delivered about one-third more power. The cylinders being of the same size as those of the old model, production could have been gotten under way speedily, as cylinder forgings, pistons and connecting rods all were exactly the same. However, it appears that the eight-cylinder design did not fully meet expectations, as a new six-cylinder type of about the same piston displacement was later developed and placed in production.

Just what were the reasons for abandoning the eight can only be conjectured. It is, however, not difficult to see several points where trouble would likely be met with an aviation engine of this type. The exceedingly strong crankshaft is apt to whip and cause undue vibration at certain speeds. The dynamic forces on the reciprocating parts are not in complete balance as they are in a six, and the rather long inlet manifold required is likely to cause trouble from uneven distribution, especially at high altitudes where the temperatures are low. From the production standpoint the six-cylinder engine is, of course, a better design than the eight, as the amount of machine work is cut down.

There are quite a number of successful eight-cylinder V engines being built for aviation, and it would seem that when eight cylinders is the least number from which the desired amount of power can be obtained the V arrangement is preferable to the all-in-line.

War-Born Industries

THE war is responsible for the rapid development of the electric steel industry in this country. Previous to the outbreak of hostilities a good deal of alloy steel came from Germany, and an attempt to manufacture annular ball bearings in this country about 10 years ago failed because the proper grade of steel could not be obtained here. The cutting off of the foreign supply threw us upon our own resources, and to-day the United States is undoubtedly producing high grade alloy steels in greater quantities than any other country. Necessity, which is proverbially the mother of invention, also is a great stimulant to commercial enterprise. Many lines of industry are now being developed which were being neglected before the war because we are in position to get the products conveniently from other countries.

□ Latest News of the

Congress Listens to Dealers' Plea

Vesper and Committee Impress Ways and Means Body with Need for Equitable Taxation

WASHINGTON, D. C., June 26—Automobile dealers approve a tax on car owners.

They do not object to a slight increase in the present 3 per cent gross sales tax if the exigiencies of the war demand it.

They disapprove of a classification of automobiles as non-utility vehicles.

These were the chief points in a brief presented to the Ways and Means Committee of Congress, which is developing the new war revenue bill, by F. W. A. Vesper, president of the National Automobile Dealers Association here to-day.

Vesper's presentation was well received by the committee, which displayed considerable interest in the matter of taxing cars. He was accompanied by other officers of the organization and members of the association tax committee.

Vesper suggested a federal license in the form of a wheel tax amounting to $5 for cars worth up to $600, $10 on cars up to $1,100, $15 on cars valued to $2,000, $20 on values to $3,000 and $25 on cars worth more than $3,000.

He told that the dealers are a patriotic body of men, anxious and willing to do anything the Government desires and needs, and pointed out that they must be allowed to stay in business profitably if they are to continue to provide mechanics for the army, funds for Liberty Bonds and for other war activities. More than 15,000 automobile dealers, he said, deal mainly with rural trade and have aided importantly the development of the farm through automobile sales to farmers. The peculiar structure of the Automobile dealer establishments caused by the various laws and the commodity itself was explained in detail to the committee to show that these buildings could not be used for other businesses and that any tax severely curtailing the automobile business would create a great financial loss and a vast number of business difficulties.

Vesper pointed out particularly well the utility of the passenger car, describing at length the various important utilitarian uses, including statements showing that doctors, contractors, farmers and many industries are importantly aided by the passenger car. He showed that the farmers are now keeping their sons on the farms through the use of cars.

Following the presentation the Congressmen questioned Vesper and were particularly interested in his suggestion of a wheel tax on owners, which he said would produce $65,000,000 a year as compared with $30,000,000 produced by the three per cent gross sales tax, which he advocated should also be maintained.

Congressman Longworth inquired if there would be any objection to an increase of the three per cent tax. Vesper said that an increase to 10 or 15 per cent, as has been forecast by newspapers, would certainly work great harm and put many dealers out of business, but the dealers had no objection to a slight increase if it was found necessary. The discussion developed the fact that in most instances the tax is passed on to the consumer while in some cases the dealers are absorbing it.

Congressmen said that there are four possible plans of taxing automobiles under consideration: A tax on oil and gasoline used in automobiles solely for pleasure purposes, a tax on chauffeurs, a tax on the gross sales, and a tax on car owners. Vesper was asked what he thought of the tax on gasoline and oil and he proclaimed it impracticable, stating that it would be impossible definitely to keep track of the amounts used solely for pleasure. The Congressmen were in accord with his statement. One Congressman suggested that it might be necessary to use all four methods of taxation.

Some objection was made to the tax on car owners because this would allow a tax on all personal property by the Government. Vesper suggested that the tax be an annual licensing plan rather than a direct tax and be collected at the same time that the states collected their wheel tax. This found approval.

The question of used cars and their value for taxation was brought up by a Congressman who declared that they would be appraised at too low a value. Vesper told that there is a well regulated scale of prices for used cars which could be used to estimated their value for taxation purposes.

Congressman Longworth inquired what profit Vesper made as the Buick dealer and was told twenty per cent. He remarked that with this amount of profit the three per cent gross sales tax could scarcely have a serious effect.

The Congressmen were generally well impressed by Vesper's statements and seemed particularly interested in his plan for a tax.

Vesper's presentation did much to place concretely the dealer viewpoint before the Ways and Means Committee, which listened with interest and much attention to the suggestions and remarks coming from an organization representing thousands of dealers.

Fuel Situation Still Indefinite

No Order Issued and Decision Rests on Supplies—Some Makers Well Stocked

WASHINGTON, June 25—The fuel situation as regards the passenger car manufacture is still indefinite. Dr. Garfield's recent statement that passenger car makers would have a 75 per cent coal reduction allowance as compared with last year has not been definitely converted into an order. In fact, this decision rests upon two fundamentals, the War Industries Board steel allowance to be investigated, and the future coal supply conditions.

If the War Industries Board does not curtail passenger car manufacture to 25 per cent of the 1917-18 allowance, and coal conditions do not improve, Dr. Garfield will take steps to issue an order cutting coal allowance of passenger car manufacture to 25 per cent of 1917-18 period for 1918-19.

Questionnaires have been issued, as has been told in these columns previously, to manufacturers of war products, which they are requested to fill in and return immediately to the United States Fuel Administration. These questionnaires inquire into the amount and kind of war work performed, and the amount and kind of non-war work engaged in. They ask numerous questions along this line, and it is upon the replies that the Fuel Administration expects to base its fuel allowance for the coming year.

Detroit passenger car manufacturers are unable to state at this time just what effect Dr. Garfield's proposed order cutting off 75 per cent of their fuel will have on their production. It is too early to make any prophecy. It is believed it will have little effect except for those without Government work, as power and heat are required to carry on war work. There would be no saving to manufacturers with Government work to run only part of their plants. This would increase overhead.

The fuel order may be regarded with more concern by smaller manufacturers without Government work.

Whether manufacturers will continue on a 25 per cent basis or shut down entirely or divert their efforts to Government work is not divulged. Both Ford and Dodge have great stores of coal at this time, but how long this will carry them is not known. Many other manufacturers have been storing fuel for some time.

The Fuel Administration will shortly

(*Continued on page* 1283)

Automotive Industries

Makers Protecting Distributers

Lowered Production Requires Equitable Shipments—Dealers Adding to Lines

DETROIT, June 25—In spite of the diminishing production the distribution agencies of most of the passenger car manufacturers are still intact. It is true that distributers are not receiving as many cars as they desire, nor as many as they need to supply the increasing demand, but they are holding to their lines, making the best of the situation, and accepting what supply they can get from the manufacturers. There are many who, rather than step out and relinquish their agency, have added another line of cars at a different price which does not conflict with their present line, or have taken on the agency for a tractor or truck line. The acquisition of a line of accessories has proved successful for many.

Manufacturers are protecting their distributers as much as they possibly can, endeavoring to equalize distribution all over the country. But where production is so low that an attempt to make an equal distribution would result in too thin an apportionment it is obvious that another course must be taken; a number of the distributers must be eliminated. With such action necessary the question of which agencies to drop is an easy one to answer. Some of the manufacturers state we are in a cleaning-up period—a weeding out of the poorer material. It is only natural that the "live-wire" agents or distributers should be helped and encouraged.

The Packard Motor Car Co. is letting distributers work out their own salvation, but these dealers are in a different position from the majority; trucks help out the situation. Some of the distributers are taking on other lines, while a few are dropping their extra lines because they find that some additional lines are not paying the proper proportion of the overhead.

About 10 per cent of the distributers of the Saxon Motor Car Corp. have taken on other lines, but none of them has given up his agency.

A few of the distributers for the Oakland have taken on tractors and trucks. The Oakland company has been able to send a satisfactory number of cars into each territory.

Willys-Overland, Inc., has been able to maintain a general distribution. A number of the company's distributers have added a truck line. The same condition prevails in the case of Reo and several others.

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Dart Reorganized; Adds Tractor

WATERLOO, IA., June 24—Dart Truck & Tractor Corp. is the new name of the Dart Motor Truck Co., which has been reorganized and plans considerable expansion in its production activities. The present officers and department heads will remain and the company will continue to manufacture its line of 1-, 2- and 3½-ton trucks; in addition it is to place on the market a farm tractor which will be styled "Dart Blue J."

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Coffin Examined in Aircraft Investigation

WASHINGTON, June 25—Howard E. Coffin, recently chairman of the Aircraft Production Board, was examined by Charles E. Hughes and Assistant Attorney General Frierson at the Department of Justice, in the aircraft investigation. Mr. Coffin's examination occupied most of the day, and Attorney General Gregory himself was present the greater part of the time. Neither Mr. Coffin nor the investigators would discuss the inquiry. Mr. Coffin left the Department of Justice in his usual good humor, and apparently had not been seriously affected by the investigation.

It was said that the aircraft inquiry is approaching a conclusion, and that a report will probably be made to President Wilson by July 10.

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Government Labor Census

WASHINGTON, June 25—All war industries have been asked to estimate their requirements for unskilled labor for the next 90 days, by the Department of Labor, United States Employment Service Division.

At the same time the Employment Service has started a collection of statistics of the unskilled labor reserves in each state. When the estimates of employers and the supplies available are both received the Employment Service will prepare its allotments of quotas of such labor, which each state will be called upon to furnish for war work. All workers not engaged in essential war work will be included as unskilled.

The estimate of the number of unskilled laborers not engaged in war work will be made through the State Employment Service offices, and the estimates will be filed before July 10. Although the Employment Service will not exclusively control labor until Aug. 1, it desires to have its machinery in order by July 15.

Reorganization For Motor Transport

Several Executive Officers Shifted—No Slackening of Truck Production

WASHINGTON, June 25—A reorganization of the Motor Transport Service under Colonel F. Glover is in process. Colonel C. B. Drake, in charge of purchases, and Lieutenant-Colonel James Furlow, in charge of operations, have both been transferred to the General Staff of the U. S. Army.

Lieutenant-Colonel Edwin S. George, at one time Packard agent in Detroit, and recently in charge of motor trucks for the Signal Corps, has been transferred to the Motor Transport Service, succeeding Colonel Drake as chief of purchases under Colonel F. Glover.

The newspaper reports published this week to the effect that truck manufacturers have been requested to slacken truck production because too many trucks were coming through in comparison to shipping tonnage, are untrue. The Army is taking military trucks as fast as they can be produced.

Final Decision on A Truck Withheld

It is reported, although not officially, in Washington, that the Class AA, ¾-ton standardized truck, failed in the recent tests because of a weak frame, and consequently has been discarded. The report says that the General Motors Co. truck, No. 16, of ¾-ton capacity, has been substituted for the AA, and will be known as the AA truck. Final decision on the A truck has not been made. The Class B 3-ton standardized truck has, as was recently announced, been officially accepted as the standard army truck of that capacity. It is stated that 5000 of the AA trucks will be ordered within a short time.

It has been said by several officers that the tests which were conducted by the Motor Transport Service Board were incomplete. It has been pointed out that only one or two trucks of a model were used, and that the tests were only of short duration. The use of only two models of a type, and of tests of short duration, it is claimed, prohibit really complete results.

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Goodyear Gets Medical Corps Contracts

WASHINGTON, June 24—The Goodyear Tire and Rubber Co. has received contracts from the Medical Department for clarified tubes and chin rests.

2000 Leyland Trucks a Year

War Output Figures and Financial Statement of a Large British Manufacturer

LONDON, June 12—It will be of interest to the American trade to compare the latest output and financial statements just issued by the Leyland Motor Company, which may be taken as representative of the half dozen largest motor truck manufacturing companies in Great Britain, with similar statements and output capacities of the largest American producers. The present rate of production at the Leyland plant is 2000 trucks per year, including spare parts. The capacity, when sufficient steel and other raw material are available, is over sixty trucks per week, or slightly more than 3000 per year.

Practically the whole of the output is now purchased by the British Government for transport purposes of the Royal Flying Corps. The company also supplies the Indian Government with motor trucks. In addition, it has on hand a large number of civilian orders for after the war.

The table below gives the gross earnings and net profits for the years 1911 to 1916 inclusive. In calculating the net profits allowances have been made for heavy depreciation on buildings, plant and machinery and for the workmen's compensation fund as well as income tax, but no deductions have been made for excess profits taxes and for munitions levies.

	Gross Revenue	Net Profits
1911	$808,550	$99,975
1912	1,336,260	240,810
1913	1,648,315	290,565
1914	2,515,850	425,185
1915	5,553,205	1,260,535
1916	7,070,365	1,389,005

The amount available for the shareholders on the basis of net profits for 1916, after making provision for excess profits taxes, should be over $575,000. This amount, after paying the preference dividend ($60,000), would leave over $515,000 available for dividends on the ordinary shares and for reserves.

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Garfield After Coal Information

WASHINGTON, June 21—All industries or concerns using 500 tons of coal or more annually are urged by the United States Fuel Administration to promptly fill in the questionnaire which has been sent to them by Dr. Garfield's organization.

The purpose of the questionnaire is to establish without dispute the industries entitled to places on the "preference list." These industries will be served with coal in sufficient amounts to care for their current requirements before distribution is made to other consumers.

The preference list already established by the War Industries Board is being re-classified to maintain degrees of preference. The first degree of preference has already been determined, and includes railroad fuel, steamship bunkers, exclusive of pleasure crafts, and by-product plants. The second, third and fourth degrees of preference are for the present being considered as one group, and no differentiation will be made between them until the complete re-classification has been made.

Delay in furnishing the information asked for in the questionnaire forces delay in completing the new preference lists, and this, in turn, delays the proper working of the distribution plan. Only to those plants which make the reports asked for, promptly, can the coal necessary for continued operation be assured.

—

Major Shaw Heads U. S. Machine Shop

FORT SAM HOUSTON, TEXAS, June 24—The new motor repair machine shop which is to be constructed upon a tract of 84 acres of land situated immediately southwest of San Antonio will be under the direction of Major Arthur M. Shaw, Construction Quartermaster Mechanical Repair Unit No. 304. Major Shaw comes to San Antonio from Atlanta, Ga., where he is just completing a similar shop.

The main shop buildings, which will cost more than $1,000,000, will be of steel frame structure 500 ft. square, with all glass sides, and will be devoted exclusively to repair work. Another building of the same type will be erected on the tract and will be used for storage of parts and repaired vehicles. A large garage will also be used for storage of finished vehicles held for shipment. Barracks will be erected nearby for the housing of the whole of Mechanical Repair Unit No. 304. Space is being reserved on the northeast corner of the area for another repairshop to be built later.

These shops will be a permanent establishment, and although now only enlisted men are employed, it is expected that they will be supplanted by civilian labor after the war.

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First German Seaplane Downed

WASHINGTON, June 21—Ensign Stephen Potter, U. S. Naval Reserve Force, who was killed in action on April 25, is credited with shooting down the first German seaplane destroyed by an American naval aviator. On March 19, 1918, a long-distance reconnaissance of the German coast was made by large American flying boats operating from a British Royal Air Force Station. Two American naval aviators accompanied this expedition, and one of them, Ensign Potter, was successful in shooting down a German seaplane which attacked the formation. A second enemy machine was put to rout at the same time. After making a highly successful reconnaissance flight the seaplanes returned to their base, having sustained slight damage. The return trip was made in 6 hours and 33 minutes of actual flying. On April 25 Potter was killed in a fight with seven enemy single-seaters.

England Gets 6000 Fordsons

Complete Order Has Already Been Delivered—Retail Price of Tractor to Be $1250

LONDON, July 18 (By Cable).—The 6000 Fordson tractors ordered by the British Government from Henry Ford & Son, Dearborn, Mich., have all been delivered, and Henry Ford has now completed all his obligations with the British Government so far as the Fordson tractors are concerned.

Now that the Government order of Fordsons has been completed, this tractor has been placed on retail sale at a purchase price of $1,250. No information is available as to the quantities in which these tractors will be available for private sales.

In order to carry out still further its program of standardization on tractors the Government has started the sale of all of its tractors except Fordson and two International Harvester models, namely, Mogul and Titan. This has been done to secure standardized working conditions and simplify to the greatest extent the distribution of spare parts as well as the education of operators for tractors.

In recognition of what Percival Perry, head of the Ford interests in England, has done for the Government, he has been knighted and is now Sir Percival Perry. In addition to his tractor activities he is now director of the mechanical warfare department of the Government.

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U. S. to Make Pursuit Plane

WASHINGTON, June 22—Production of a fast single-seater fighting airplane will soon be under way in this country; the machine selected is said to be the development of a modern British pursuit plane which has been very successful. Details of construction and performance of this machine have not been made public. Up to this time construction of single-seater fighting machines has not been undertaken in this country, as they have been turned out by the French and British factories for the American Army.

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Crowder Exempts Chauffeurs

WASHINGTON, June 21—Chauffeurs, private and public, will not be considered as domestic servants under the "work or fight order," and will not be liable to draft, despite newspaper dispatches. Provost Marshal Crowder ruled to-day that chauffeurs of all classes, excepting those who actually engage in domestic work, will be exempt from the "work or fight" classifications.

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Start Truck Postal Delivery

WASHINGTON, D. C., June 21—Daily automobile parcel post service between New York and Worcester, Mass., will be started on July 1. When a bad stretch of road between Waterbury and Hart-

ford, Conn., has been put in shape, the route will be extended to Portland, Me. Repairs to this road are scheduled to be completed by July 15. Stops will be made at Danbury, Conn., and Springfield, Mass., and other points along the line. With the New York-Portland service started, parcel post trucks will be in operation in connecting links over a continuous route between Portland and Warrenton, Va. Truck service between New York and Washington already is in operation. Further extension southward will be made as soon as cars can be secured.

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Allocate Allied Oil Purchases

WASHINGTON, June 21—Oil purchases for the Allies will be allocated by a committee appointed to-day by the United States Fuel Administration. The committee comprises A. C. Woodman, director of purchases of lubricants of the oil divisions, and J. A. Noffett, Jr., secretary of the National Petroleum War Service Committee. The object of this committee is to accomplish the most equitable distribution of the orders of the Allies for oil throughout the entire industry, and at the same time to insure the Allies prompt sources of supply with as little interference as possible with the requirements of our own industries.

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Wilmington Puts Embargo on Cars

WILMINGTON, June 24—Because of the tremendous demand on railroad facilities entering Wilmington, due to munition and shipbuilding establishments and other incidental war enterprises, the railroad authorities have established a hard and fast freight embargo against passenger cars. As a result cars that are not on the truck class that are shipped to Wilmington by freight are halted at the nearest outside delivery point, where they are unloaded and run into the city under their own power. Most of these cars are delivered at West Chester, Pa., which is 20 miles distant, and where the freight congestion is about as near the minimum as can be found in this part of the country.

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Urge More Road Construction

WASHINGTON, June 22—Motor truck mail service showing a surplus of $200,000 for its first 6 months of operation warrants immediate legislation for road construction that will extend the service throughout the country. This was the statement of James I. Blakeslee, Assistant Postmaster General, yesterday before the House Post Office Committee. Mr. Blakeslee appeared before the committee to urge the building of highways as a part of a national highway system.

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Moline Tractor With Plow Costs $1,385

MOLINE, ILL., June 25—The new 4-cylinder Model D tractor manufactured by the Moline company sells for $1,385, f.o.b. Moline. This price includes a two-bottom Moline plow.

Paying for Cars Taken for War

British Adopt Per Diem Rate and Appraisal and Compensation Plan

LONDON, June 12—In exercising its power to commandeer the services of commercial motor vehicles used by private owners, the new Road Transport Board has recently established a definite scheme to cover payment for vehicles used in this way. To avoid confusion regarding payments, a definite schedule has been adopted and this schedule will apply also to vehicles taken over at any time temporarily by motor volunteer units.

Under the new scheme cars are divided into five groups:

A—For loads of 3 tons and upward.
B—30 cwt. to 3 tons.
C—15 cwt. to 30 cwt.
D—Motor cars.
E—Motorcycles.

Owners of cars in classes A and B will be paid $20 a day; for classes C and D, $15 a day, and for class E, $3.75 a day, if their vehicles are called up on national emergency. On being called out for service, tires, gasoline and other stores will be supplied, and repairs effected free of cost to the owner. These rates are only payable for service up to 60 consecutive days, not for periods longer than this.

If the vehicle is destroyed, compensation will be paid at a rate equivalent to the value of the car when taken over plus 25 per cent, provided the resulting amount is not greater than the original purchase price, or less than 30 per cent of that price.

The value at the time of taking over is estimated by deducting from the original price 7½ per cent for each half year or part of a half year which shall have elapsed since the car was delivered by the manufacturer to the purchaser. As an alternative, the Army Council at its discretion may provide an equivalent vehicle to replace the one destroyed.

At least once every half year an inspection officer shall be given adequate facilities to inspect and test the vehicles coming under the scheme, and if his report is unfavorable the agreement may be terminated.

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Engineers Form Joint War Committee

CHICAGO, June 25—A joint war committee has been formed by representatives of technical societies of the Chicago zone to co-operate for war work. The movement was started by the Military Committee of the Western Society of Engineers, and the committee will endeavor to call into play the efforts of individual members of each of the organizations represented as they are needed. The societies co-operating in the War Committee follow:

Western Society of Engineers.
Structural Engineers' Association of Illinois.
Society of Industrial Engineers.
Illinois Society of Engineers.
Illinois Society of Architects.
The American Railway Engineering Association.
The Swedish Engineers' Society of Chicago.
Illinois Chapter, American Institute of Architects.
Chicago Section, American Society of Mechanical Engineers.
Chicago Section, American Institute of Electrical Engineers.
Chicago Section, American Chemical Society.
Chicago Section, American Institute of Mining Engineers.
Mid-West Section, Society of Automotive Engineers.
Illinois Association of American Society of Civil Engineers.
Chicago Section, American Society of Heating and Ventilating Engineers.
Chicago Section, American Society of Refrigerating Engineers.
Chicago Section, Steel Treating Research Society.
Chicago Section, Illuminating Engineering Society.
Chicago Chapter, American Association of Engineers.

Officers of the War Committee have been elected as follows: Chairman, F. K. Copeland; vice-chairman, W. L. Abbott; secretary, Edgar S. Nethercut; treasurer, William A. Fox.

The executive committee consists of F. K. Copeland, W. L. Abbott, William Hoskins, C. A. Keller, Charles E. Lord, O. F. Loweth, Isham Randolph and Richard E. Schmidt. The address of the secretary of the War Committee is 1735 Monadnock Block, Chicago.

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Reliance Expects Government Order

APPLETON, WIS., June 24—Ira L. Miller. president of the Reliance Motor Truck Co., Appleton, Wis., has returned from a visit to Washington, D. C., with practically definite assurances that the company will be awarded Government contracts for motor trucks as soon as the new plant now being erected in Appleton is ready for regular production. It is hoped to take occupancy of the new factory shortly after July 15. While in the East Miller arranged with E. L. Levins, New York, to represent the Reliance truck in New York and New England. Negotiations for export representatives for South America and Japan are under way. The Reliance company is about to engage in an extensive national advertising campaign.

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Want Standard Wage Scale

WASHINGTON, June 22—Standardization of wages to be paid to labor by government departments and contractors engaged in war work is advocated in a resolution by the War Labor Policies Board, of which Felix Frankfurter is chairman. The resolution states that the competitive bidding by employers for labor has created an unstable wage situation both for skilled and unskilled labor, and has resulted in restlessness and wasteful movement of labor from one industry to another.

New Orders Received for Fordsons

Maryland and Delaware Place a Joint Order for 1000 of the Tractors

DEARBORN, MICH., June 22—Henry Ford & Son has received more orders from states desiring tractors. A joint order has been placed for 1000 Fordsons to go to the States of Maryland and Delaware. Deliveries have not yet started on this order. New York has ordered 1000, of which 155 have been delivered. North and South Carolina have each placed orders for 100 tractors; these orders will be completed within 30 days. Only one distributer is provided for the entire New England section; this is D. W. Flint, Providence, R. I., who has delivered 102 tractors and has orders for 200 more. One thousand will be delivered in this section. The Canadian delivery is now seventy-three tractors beyond its contract and Ford has orders for several more. It is believed the total will be 1129 before contract is closed. Of the 100 tractors ordered by Cuba thirteen have been delivered. Seven Fordsons have been shipped to South America. Deliveries to Ohio, Wisconsin, Iowa and Virginia are nearly completed. It is believed final shipments will be made about July 8. The schedule of deliveries is as shown in the table.

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Senate Committee See Eastern Plants

WASHINGTON, June 24—Members of the Senate aircraft investigating committee are not as enthusiastic about eastern aircraft plants as they were about those in the Middle West. The committee returned here Saturday after visits to Princeton, New Brunswick, Elizabeth and Plainfield, N. J., and Long Island City, Long Island. It was said that although the plants inspected are beginning to reach a quantity production, conditions are not entirely satisfactory. Details will not be made public until the complete report is filed several weeks hence. The committee will visit Langley Field, the army aviation station near Hampton, Va., this week, and then will conduct hearings in Washington.

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Commissions for 1700 Aviators

WASHINGTON, June 21—Commissions as first and second lieutenants in the Non-flying Section of the Signal Corps Reserves will be awarded to 1700 cadet flyers now training in British, French and Italian flying schools. After they have been qualified as flyers the commissioned officers will be transferred to the flying section.

DELIVERY OF FORDSON TRACTORS

State	Number contracted	Number delivered	When delivery will be completed
Michigan	1000	*552	Order canceled
Ohio	1000	749	July 8
Wisconsin	500	386	July 8
Iowa	1000	504	July 8
Virginia	200	133	July 8
Kentucky	1000	133	Indefinite
South Dakota	200	42	Ship 3 cars wk.
Nebraska	200	50	As soon as possible on account of wheat harvest
Minnesota	1000	131	
Oklahoma	200	14	August
Illinois	1000	111	Sept. Ship 4 cars wk.
Indiana	1000	401	July 15 Ship 1 car wk.
New England	1000	102	Don't know
Arizona	63	7	
Florida	None	14	
Georgia	None		
Idaho	None	7	
Kansas	200	84	
Maryland and Delaware	1000	None	3 months
New York	1000	166	August
North Carolina	100	19	30 days
South Carolina	100	7	30 days
North Dakota	500	59	August 30
Tennessee	100	85	Few days
Cuba	100	13	Expect to complete orders next week. Amount to 1129.
Canada	1000	1073	
South America	None	7	

NEW ENGLAND STATES DISTRIBUTION

Connecticut	7	....	
Massachusetts	62	....	
Rhode Island	28	....	
Vermont	5	....	
New Hampshire	0	....	
Total	102		

*Distribution in Michigan continued through agents after state cancelled order. 763 Fordsons now delivered in Michigan.

Plenty of Gasoline for All Needs

If Conservation Is Practised Curtailment Will Not Be Necessary

WASHINGTON, June 21—There will be sufficient gasoline for war, passenger car and all ordinary purposes if rational conservation is practised by the public. This is the substance of a statement issued to-day by the Fuel Administration as follows:

"Up to the present time there has been sufficient supply of gasoline to meet all requirements, but in order to be prepared for any shortage, should it arise, plans are being considered by the Oil Division of the Fuel Administration, in co-operation with the automobile industry and the National Petroleum War Service Committee, for the purpose of determining the most satisfactory method of gasoline conservation.

"It is not expected in any event that it will be necessary to restrict normal consumption for freight vehicles; and provided there is a reasonable conservation by all concerned, it may not be necessary to seriously interfere with pleasure cars and motor boats.

"It must be borne in mind, however, that the paramount use for gasoline is for war purposes, all of which requirements will be supplied. The volume of this will largely govern the situation.

"It seems possible that rational conservation by the public will render Government action unnecessary."

—

Steel Priorities for Oil Production

WASHINGTON, June 21—Oil production will be considered vitally essential by the War Industries Board when it decides priorities of steel shipments. Fears on the part of the oil industries that it would not be classed as essential have been dissipated by a letter from the U. S. Fuel Administration to the National Petroleum War Service Committee as follows:

Mr. A. C. Bedford,
Chairman National Petroleum War Service Committee, New York City.

Owing largely to the press reports regarding the action of the War Industries Board in taking over the entire steel production of the country for Government requirements and not making clear the point that the term "Government requirements" included all essential requirements not ordered directly by the Government for Government use, a wrong impression has been created in the minds of consumers, such as oil producers, for instance, and they seem to think that the action of the War Trade Board is going to have the effect of curtailing and even shutting off completely the supply of these essentials, and this has resulted in more or less of a scramble to cover their requirements on orders in excess of their real needs and also in the hoarding of materials, which, in its turn, results in inequitable distribution and profiteering in price.

The effect of the action of the War Industries Board should be exactly opposite. The

taking over of the steel production by the Government and the allocation of that tonnage to essential industries only is calculated to increase greatly the supply of essential products, and, of course, the production of oil and gas and of all kinds of oil well supplies used in that production or in the pipe line transportation of same has already been classed by the War Trade Board as highly essential to the Government program in the prosecution of the war; therefore their action is going to be a very great assistance in immediately relieving the shortage that has existed in a few items, such as wire rope, tubular goods and boilers.

At the same time it should be thoroughly understood that every pound of steel or other essential commodity that is diverted from use in the building of ships, airplanes, and munitions has a proportionately retarding effect upon the completion of the Government's program, and therefore no truly patriotic citizen will consume these valuable commodities wastefully.

For obvious reasons we think it highly desirable that this view of the situation be thoroughly and promptly disseminated among the producers, and we know of no better way than to enlist the services of the various petroleum war service boards in this matter. Can we have your assistance?

Yours very truly,
U. S. FUEL ADMINISTRATION,
Oil Division,
GEO. E. DAY,
Chief of Oil Well Supplies.

—

Coal Priorities for Cement Makers

WASHINGTON, June 25 — Cement manufacturers will have preferential treatment by the Fuel Administration for a reasonable supply of fuel. The manufacturers have agreed to curtail their operations to the point where production will be sufficient to meet only direct and indirect war requirements and the demands of national or exceptional importance. A conference was held here to-day which resulted in the above agreements.

—

Skilled Labor Shortage Critical

WASHINGTON, June 27—It is expected that the present ban against the private recruiting of common labor, which becomes effective Aug. 1, will be made to include skilled labor as well. At the present time government arsenals are short 4000 skilled workers and the lack of machinists, particularly, is critical. The International Association of Machinists is being mobilized and deferred classification in the draft for skilled machinists, as well as furloughs for those drafted, are steps which are being taken to alleviate the shortage. The association will allocate its skilled mechinists and will assist in the transfer of those engaged in non-war work.

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Cell-Beam Resumes Marketing

NEW YORK, June 27—The Cell-Beam Mfg. Co., 1101 Bedford Avenue, Brooklyn, manufacturer of the Cell-Beam searchlight, has resumed the marketing of its product direct from the factory, through the jobbing trade. This policy will permit closer co-operation between the jobber and the manufacturer.

Iron Price Increased 45 Cents

War Industries Board and Iron and Steel Institute Advance Cost of Ore to $5.50 a Ton

WASHINGTON, June 22—An increase of 45 cents a gross ton in the price of iron ore effective July 1 was agreed upon yesterday by the War Industries Board, American Steel and Iron Institute Committee and members of the steel industry. Further important announcements resulting from the meeting and affecting shipments of steel to non-war industries are expected within the next few days. There will be no changes made in the Government's schedule of fixed steel prices, which has been in operation since last fall, with the exception of the slight reductions of pig iron and scrap iron prices authorized March 26 last.

The agreement to increase ore prices will bring the new material up to $5.50 per gross ton at lower lake ports, and will probably be effective for 3 months. Increased freight rates, transportation difficulties and labor shortage were the reasons that actuated price increase.

The steel prices are those made effective last fall, beginning with prices fixed for iron ore, coke, pig iron, etc., on Sept. 22, and extending over a period to Nov. 5, when the prices of pipe, cold-rolled steel, scrap, wire and tin plate were promulgated.

These prices were extended to July by a proclamation issued March 26 and effective April 1, with a reduction of from $33 to $32 a ton in basic pig iron and from $30 to $29 a ton in scrap steel.

Following is the complete text of the order:

1. Lake Superior iron ore.—Base prices of Lake Superior iron ore delivered to lower lake ports are increased 45 cents per gross ton on and after July 1, 1918, subject to the following condition: These increased prices are based on the advances in rail freight rates effected June 25, 1918, and on the present lake rates, and in the event of any increase or decrease in either rail or lake rates said prices shall be increased or decreased accordingly on all deliveries made during the continuance of such increased or decreased freight rates.

2. On and after July 1, 1918, the basing point for steel bars, shapes, and plates will be Pittsburgh, Pa.—No new contracts calling for delivery of any of the above commodities or articles on or after October 1, 1918, are to specify a price unless coupled with a clause making the price subject to revision by any authorized United States Government agency, so that all deliveries after that date shall not exceed the maximum price then in force, although ordered or contracted for in the meantime. It is expected that all manufacturers and producers will observe the maximum prices now fixed.

—

Bosch Magnetos Re-christened "Liberty"

NEW YORK, June 27—Insofar as Australia is concerned, Bosch magnetos are now known as Liberty magnetos. The change in name follows an order of the Comptroller General of Customs for Australia prohibiting the importation of magnetos bearing the name Bosch. The magnetos themselves are not banned, but the name is, and hence, on all shipments to Australia, Tasmania and New Zealand the name Bosch has been supplanted by the name Liberty. The edict applies to magnetos shipped separately or as part of the equipment of cars, trucks, motorcycles, etc., but instruments shipped prior to June 20 will be admitted under the name Bosch. The Bosch Magneto Co. expects to ship 7000 instruments during the current twelvemonth.

—

Baker Confers With English General

WASHINGTON, June 24—Major General Brancker, Comptroller General of Equipment of the British Royal Flying Forces, conferred Saturday with Secretary of War Newton D. Baker. Some American officers here are not in agreement with the statement that the Liberty engine is not sufficiently reliable to attempt the transatlantic flight. They believe that because of the British limited experience with Liberty engines they may possibly not understand its full power and reliability.

—

Captain Cranston Conceived Nash Quad

KENOSHA, WIS., June 25—The designing of the Nash Quad which was formerly the Jeffery Quad has been the subject of some speculation since four-wheel-drive vehicles have come in for so much attention in war use. The original conception of the Jeffery Quad came from Captain Cranston, an army official in charge of transportation on the Pacific coast. Captain Cranston in company with L. H. Bill, who was connected with the Jeffery organization, laid the design before Charles T. Jeffery and the work of developing an experimental model was proceeded with. The question of design was not that of any one person connected with the organization, but rather with several. George W. Smith, then chief engineer of the Jeffery organization, worked out the details of driving all four wheels through the internal gear principle and combining therewith a good clearance. After the experimental model was designed, it was given a tryout in Mexico and since then has been going through the usual refining process. When the Jeffery organization was taken over by C. W. Nash, the engineering work on the Quad passed to the department headed by N. E. Wahlberg, chief engineer of the company.

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Remy Advances Conklin and McMahan

DETROIT, June 27—O. F. Conklin, who has been chief engineer of the Remy Electric Co., Anderson, Ind., since it first began producing automobile equipment, has been made general manager of all Remy interests, succeeding H. W. Griffith. G. V. McMahan, who has been with the Remy company for 6 years, recently as sales manager of the Motor Equipment Division, has been appointed assistant general manager. He succeeds John G. Wood, who with Mr. Griffith, has entered the Mid-West Engine Co., Indianapolis, which has been formed by S. A. Fletcher.

To Establish More Aviation Schools

Two Will Be Started on Pacific Coast as Result of Naval Aircraft Investigation

WASHINGTON, June 24—As a result of investigations which have been carried out by the Committee of the House of Representatives appointed to look into the conduct and administration of naval aircraft affairs, two more aviation schools are to be established on the Pacific Coast. One will be at Riverside, Cal., and the other at Sacramento. The decision to establish these schools was made largely upon the recommendations of Capt. Noble E. Irwin, whose investigation revealed that flying conditions on the Pacific Coast are more conducive to the results which are sought than are those in the South and East. Following is the text of Capt. Irwin's report:

It is assumed that the percentage of sunshine is a fair measure of the amount of time when flying is possible. A comparison shows that San Antonio with a ratio of 56 per cent is fairly typical of the South and East. Los Angeles has 73 per cent sunshine. The rainfall at San Antonio is nearly double that at Los Angeles (27 to 56 in.).

Percentage of sunshine at Los Angeles.. 73
Percentage of sunshine at San Antonio.. 56

Ratio at Los Angeles as compared to San Antonio 73/56 = 130 per cent, or Los Angeles has 30 per cent more flying time than San Antonio.

Fixed charges and payroll (annual cost of camp)	$2,000,000
Assuming 100 machines are always in service, the standing investment therein is 100 × $12,000	1,200,000
Cost of plant	3,200,000
Interest cost per annum at 4 per cent	$128,000
900 men in camp, with average rate for pay and expense of man of $3 equals $2,700 per day, and 365 days × $2,700 equals, per year	985,500
Interest, expenses and payroll	$1,113,500
Los Angeles per cent of sunshine, 30 more than San Antonio, and efficiency of Los Angeles is therefore 30 per cent greater. The value of this efficiency is $1,113,500 (annual fixed cost) × 30 equals (per annum)	334,050
Excess cost of Los Angeles as compared to Southern camp, due to transportation charges is (per annum)	54,000
A net saving for Los Angeles (per annum) of	$280,050

Los Angeles has warmer winters and cooler summers; both more agreeable for flying. In addition to money value there is a saving in time in preparing for the war.

I also wish to state that according to the Annual Meteorological Summary of the Weather Bureau of the Department of Agriculture compiled for San Diego, Cal., for the year 1917, the maximum of the mean monthly temperature for that year was 67.4, while the minimum mean monthly temperature was 54.2, showing a variation of 13.2 deg. for the entire year, based upon monthly means.

The percentage of sunshine, which I understand is generally assumed as a fair measure of amount of time when flying is practicable as discussed by these same comparative meteorological data, indicates that for the years beginning 1894 and ending 1917 practically 79 per cent of a possible 100 were hours of sunshine.

A significant fact in connection with this high ratio is this: The highest percentage of possible hours of sunshine during this period of time was in the months of November, when 76 per cent of a possible 100 hours were hours of sunshine, while the lowest percentage appears to have been in the months of May, which shows a 57 per cent of the possible 100. The same report shows there is an average of but 9 days a year without sunshine.

Another strikingly important factor appertains to precipitation records. During the year 1917, according to the summary hereinbefore mentioned for the year, the very low figure of 8.04 in. appears, over half of which came during the month of January.

From the meteorological summary above referred to I quote the following: "There is an average of but 9 days a year without sunshine."

—

Curtiss to Prevent Labor Dissatisfaction

BUFFALO, N. Y., June 25—The Curtiss Aeroplane & Motor Corp. has established a square deal department in its division of education and welfare, which is to act as a court of appeals in all cases of dissatisfaction on the part of employees. The department will review each case that arises, and no employee may leave the organization until it is found that efforts of the department to remove the cause of dissatisfaction have failed.

—

Packard Makes Large Additions

DETROIT, June 24—The Packard Motor Car Co. has leased the buildings formerly occupied by the National Body & Trimming Co., in the rear of the Packard factory, for a term of 3 years. These buildings have a floor space aggregating 100,000 sq. ft. The Packard company will take possession in July, and utilize the plant for general manufacturing and storage purposes. The National company has gone out of business.

—

School Abandons Flying Field

DETROIT, June 25—The National Training School has moved its airplane and automobile departments to new quarters at 761 Cass Avenue. The airplane department has abandoned its idea of acquiring a tract of land for flying purposes as a result of a Government order. This was due to the fact that the land proposed for purchase is too close to the Government flying field. Steps are being taken, however, to establish a field near St. Louis.

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Des Moines Adopts Closing Rule

DES MOINES, IOWA, June 25—Twenty-two garages and repairshops of this city have formed an agreement to close at 6 p. m. daily, and all day Sundays and holidays. No repair work or accessory sales will be handled after 6 p. m., but enough employees will remain to handle the cars in storage.

M.A.M.A. Lifts Ban on Chicago Show

Recent Ruling That Exhibit of N.A.A.A.J. Would Not Be Sanctioned Is Revoked

NEW YORK, June 24—The accessory—or rather "automotive equipment"—atmosphere has been considerably clarified and there is joy in trade circles generally through the lifting of the ban of the Motor and Accessory Manufacturers' Association on the fall exhibit to be held by the National Association of Automobile Accessory Jobbers.

The M. A. M. A. recently declared that it would not sanction the jobbers' exhibit and ruled that any M. A. M. A. member exhibiting would be barred from showing at the New York and Chicago shows. But at Friday's meeting of the M. A. M. A. executive committee this action was rescinded.

There appeared before the committee a committee representing two or three dozen manufacturers who belong to both associations. These members stated that the jobbers' exhibit will not be a show, will not be open to the public, no admission will be charged and the exhibit will not be operated for profit. The M. A. M. A. executive committee then ruled that the exhibit did not fall within its jurisdiction and took the action which makes it possible for those belonging to both associations to enter the jobbers' exhibit without incurring the displeasure of the M. A. M. A. This action has removed a serious sore spot from the accessory trade.

The M. A. M. A. show committee was instructed to take up with Manager Samuel A. Miles the matter of participation in the 1919 New York and Chicago shows as usual.

The following members were admitted:

Buffalo Pressed Steel Co., Buffalo, N. Y., automobile silencers and stampings; Staybestos Mfg. Co., Philadelphia, brake linings for cars and industrial machinery; Hartford Auto Parts Co., Hartford, universal joints and cone clutches; Automobile Screw Products Co., Cleveland, automobile screws; Crucible Steel Co. of America, Pittsburgh, crucible and open hearth steel; Armstrong Cork Co., Lancaster, Pa., linoleum and cork specialties.

A resolution was voted thanking Christian Girl for his patriotic and energetic work in the government service at Washington. It follows:

WHEREAS, Mr. Christian Girl, president of the Standard Parts Co. of Cleveland, and a member of the Board of Directors and of the Executive Committee of the Motor & Accessory Mfrs. Assn., has patriotically and unselfishly devoted his untiring energies for the past several months as director of truck production of the Quartermaster's Department of the U. S. Army in the development of the standardized motor trucks, and in connection with same has whole-heartedly and uncomplainingly given of his time and dedicated his exceptional skill, not only to his Government but to the members of the M. & A. M. A., and as a member of the lat-

ter has performed services of singular value and has discharged these services with rare tact, skill and judgment;

NOW THEREFORE BE IT RESOLVED: That it is the sense of the Executive Committee of the M. & A. M. A., in behalf of the entire membership, that it is under deep and sincere obligation to Mr. Christian Girl for his splendid and patriotic work, for his zealous and unselfish protection of the interests of the U. S. Government, as well as the interests of the manufacturers of motors, parts and accessories, and that a vote of thanks be extended to him in appreciation.

BE IT FURTHER RESOLVED: That this resolution be spread upon the minutes of the M. & A. M. A., and that a copy of same be engrossed and presented to Mr. Girl.

—

Overland Busy on War Work

TOLEDO, June 21—The Willys-Overland Co. is now in full swing on the four large contracts and a number of smaller ones it has accepted from the Government. The first contract was through the Toronto plant with the British Government, for 1000 Sunbeam airplane engines. A quantity of these engines have been manufactured and accepted and actual deliveries are coming along rapidly.

The second large contract was for 5000 eight-cylinder training engines, for use in training planes at the several cantonments already established in this country. To take care of this contract three buildings were constructed at Elmira—an assembling plant, testing plant and a take-down and re-assembling plant. On this contract 835 engines were delivered in March and 1003 in April. During May and June, according to contract, 1000 will be delivered each month. Large orders have been received for parts for these training engines, on which deliveries are being made from the Elyria plant.

The third large order was taken by the Toledo plant for approximately 3000 gun carriages, deliveries of which will begin in June in small numbers and increasingly larger quantities thereafter monthly.

The fourth contract was for machining large size shells. The contract will amount to about $10,000. A special department has been created for this shell business the same as for the gun carriages. The manufacture of automobiles will be continued in reasonable quantities.

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Two More Flying Fields

WASHINGTON, June 25—The opening of March Field, Riverside, Cal., and Souther Field, Americus, Ga., makes a total of 27 flying fields now in use for training aviators and experimental purposes. These fields are under the Department of Military Aeronautics. March Field is named in honor of Second Lieutenant Peyton C. March, Jr., who was killed in the service as a flyer. It is under command of Major J. C. P. Bartholf. Souther Field is named for Major Henry Souther, who died in the service, and is under the command of Major C. H. Wash, Junior Military Aviator, Signal Corps.

Urge Road Economy During War

Construction and Maintenance Should Be Viewed from Military Standpoint

WASHINGTON, June 25—Road construction and maintenance during the emergency period should be viewed from a military standpoint. Expenditure of labor and materials should be directed only to those roads of prime, economic and military importance. Bond issues for road construction are undesirable at this time. Maintenance of all important highways already constructed should be continued. Important roads are those needed for the military establishment, carrying materials essential to war industries or bearing importantly on production and distribution of food supplies.

These policies are set forth by the Secretary of Agriculture, A. David Houston, in a letter to the Council of National Defense, defining the attitude and policies toward road construction and maintenance of the federal agencies dealing with this problem.

Emphasizes Importance of Highways

The Highways Transport Committee Council of National Defense, recognizing the vital military and economic importance of the highways of the country, emphasizes the policies in Secretary Houston's letter in a statement to the State Highway Departments. The text of the letter in part follows:

"1. All plans for road construction and maintenance should be viewed in the light of war conditions, and expenditure of labor and materials should be directed only to those roads which are of prime importance for economic and military purposes.

"2. It is desirable to avoid offering to the market issues of bonds which are not urgent from the point of view of aiding the Nation in winning the war.

"3. As far as practicable important highways already constructed should be maintained, and only those should be constructed and completed which are of vital importance because of their bearing on the war situation. These may be summarized as follows:

a. Those which are utilized or will be utilized by the military establishment.

b. Those which carry considerable volume of material and supplies essential to war industries.

c. Those which have a bearing on the production and distribution of food supplies, connecting population and shipping centers with surrounding agricultural areas.

"4. It is especially desirable to use wherever possible local road materials in order to simplify the rail transportation problem."

—

35 Cities Have Return Load Bureaus

WASHINGTON, June 26—The number of cities which have established Return Load Bureaus is increasing as a result of the efforts of the Highways Transport Committee of the Council of National Defense. In April these had been established in 31 cities, and the present list, which follows, includes 35:

City	Location
Connecticut	
Bridgeport	Chamber of Commerce
Bristol	Chamber of Commerce
Danbury	War Bureau or Chamber of Commerce
Greenwich	War Bureau
Hartford	Chamber of Commerce
Manchester	War Bureau
Meriden	Chamber of Commerce
Middletown	War Bureau
New Britain	Chamber of Commerce
New Haven	War Bureau
New London	War Bureau
Norwalk	War Bureau
Norwich	Chamber of Commerce
Stamford	
Waterbury	War Bureau
Michigan	
Detroit	Board of Commrece
New Jersey	
Asbury Park	Board of Commissioners
Carney	State Council of Defense
Dover	Chamber of Commerce
Garfield	Police Station
Jersey City	Chamber of Commerce
Millville	Maurice River Transportation Co.
Montclair	Police Department
New Brunswick	Home Defense League
Newark	Motor Truck Club of N. J.
Trenton	Chamber of Commerce
New York State	
Buffalo	Chamber of Commerce
New York City	Merchants' Association, Woolworth Bldg.
Syracuse	Chamber of Commerce
Ohio	
Cleveland	Chamber of Commerce
Pennsylvania	
Philadelphia	Chamber of Commerce
Rhode Island	
Providence	Chamber of Commerce

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Truck Freight Line for Philadelphia

PHILADELPHIA, June 22—Organization of the Beam-Fletcher Transportation Co., to operate long-haul, short-haul and local motor truck delivery in and out of Philadelphia, has been perfected. The company is incorporated for $500,000. It will operate a fleet of motor trucks to cities within a radius of 100 miles of Philadelphia, and has already started operation between this city and New York, Baltimore, Reading, Easton, Allentown and Bethlehem. Extensions of the service include Lancaster and Harrisburg, Trenton and other nearby centers. The company now owns 67 motor trucks, 20 of which are vans, 20 of which are open trucks used for local freight. The company is handling 200 tons of freight per day. Officers of the company include: President, P. E. Beam; vice-president, E. C. B. Fletcher, and secretary and treasurer, C. A. Bothell.

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Restrict Asphalt Imports

WASHINGTON, June 25—Asphalt has been placed upon the restricted import list by the War Trade Board. Imports for the calendar year 1918 will be limited to a total quantity of 62,000 tons, 30,000 tons from Venezuela and 32,000 tons from the Island of Trinidad. All outstanding licenses for the importation of asphalt are revoked for shipments after June 15, 1918. Allocation of the amounts permitted to be imported, regulation of the price and other details will be arranged after conference between the War Trade Board and the War Industries Board.

Government Saves Tin

War Industries Board Classifies Uses and Will Eliminate the Wasteful Ones

WASHINGTON, June 26—The War Industries Board is working for the conservation of tin, and has classified its various uses by different trades in an ascending scale of importance:

1. Wasteful uses.
2. Uses non-essential in character, such as the coating of articles for ornamental purposes only.
3. The use of tin for purposes which in themselves are useful and desirable, so that their elimination would involve a certain amount of sacrifice on the part of manufacturers, consumers or both, but which are in no way connected with the vital needs of the country in relation to the war.
4. Uses directly for war purposes either by the Government itself as a manufacturer of war materials, or by manufacturers who are making war materials for the Government.

Uses under 1 and 2 will be cut off immediately. Curtailment under 3 is not desirable, and will result in a disorganization of the industry and ought to be avoided if possible. However, the sacrifice may have to be made. Under all circumstances, the direct war requirements will have to be met in full.

The following results have already been accomplished:

1. Solder, Bearing Metals, Etc. The Bureau of Standards has completed an investigation of bearing metals and has suggested the elimination of all but four of the scores of compositions used. It is stated that a saving of about 25 per cent in the amount of tin used will be effected by this. The Bureau of Standards is making a similar investigation concerning solder. The can companies have reduced the percentage of tin in their solder to 40.

2. Brass and Bronze Ingots and Castings. A good deal of this business is directly or indirectly for the Government. A considerable reduction could be made in the tin content without reduced efficiency. Large savings have already been made by automobile and other manufacturers by substituting for all metal bearings case bearings with a thin lining shell (1/16 to 1/32 in.) of high grade babbitt. Straits tin is often specified in the assumption that it is the purest tin. Banca is even purer than Straits or Australian tin and Electric is as pure.

3. Tin Plate. The manufacture of plate for many less essential uses, such as roofing, has been eliminated by agreements. Tobacco manufacturers have agreed to substitute black plate for tin plate in most tobacco cans, effecting a saving of 750,000 base boxes of tin plate a year. The quantity of plate required for export has been greatly curtailed by the regulations of the War Trade Board restricting exports to plate which is to be used for specific purposes.

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Navy Contract Awards

WASHINGTON, June 24—The following contracts have been awarded by the Bureau of Supplies and Accounts of the Navy:

June 8, 1918.

A. Lietz Co., San Francisco, Cal.; compasses.

F. B. Harriman, Chicago, Ill.; compasses.

Star Compass Co., Dorchester, Mass.; compasses.

Aluminum Company of America, Washington; aluminum.

G. M. Trucks Co. of Washington, Washington; trucks.

June 10, 1918.

John A. Roebling's Sons Co., Trenton, N. J.; aircraft supplies.

American Steel & Wire Co., Washington; aircraft supplies.

Jenkins Bros., New York City; valves.

Rome Brass & Copper Co., Rome, N. Y.; valves.

John F. Byers Machine, Ravenna, Ohio; auto crane.

June 12, 1918.

O. A. Danzenbaker, Washington; gaskets.

Belmont Packing Co., Philadelphia; gaskets.

Crandall Packing Co., New York; gaskets.

June 13, 1918.

Willard Storage Battery Co., Cleveland; batteries.

Page Storm Drop Forge Co., Chicopee, Mass.; drop forgings.

Lakeside Forge Co., Erie, Pa.; drop forgings.

Evart Forge Co., Evart, Mich.; drop forgings.

Standard Oil Co., San Francisco; oil, lubricating.

June 14, 1918.

Texas Co., New York City; oil, lubricating.

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Ordnance Contracts Awarded

WASHINGTON, June 21—Contracts have been awarded by the Ordnance Department to the following companies:

Maxwell Motor Co., Detroit, Mich.

American Automobile Accessories Co., Cincinnati, Ohio.

Nash Motors Co., Kenosha, Wis.

Kohler Co., Kohler, Wis.

The Baker R. & L. Co., Cleveland, Ohio.

Taft-Pierce Mfg. Co., Woonsocket, R. I.

Holt Mfg. Co., Peoria, Ill.

Eisemann Magneto Co., Brooklyn, N. Y.

Four Wheel Drive Auto Co., Clintonville, Wis.

General Electric Co., Schenectady, N. Y.

U. S. Light & Heat Corp., Niagara Falls, N. Y.

Michigan Copper Banding Co. (Inc.), Philadelphia, Pa.

Brown & Sharpe Mfg. Co., Providence, R. I.

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Navy Contract Awards

WASHINGTON, June 25—The following contracts have been placed by the Bureau of Supplies and Accounts of the Navy Department:

June 17, 1918

Ford Motor Co., Detroit; parts.

June 18, 1918

Curtiss Aeroplane Motors (Ltd.), Toronto, Canada; surfaces.

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Spooner Resigns from Automotive Show

CHICAGO, June 21—F. Ed. Spooner, who was appointed chairman of the truck committee of the Automotive and Accessories Exposition, Inc., which is to hold a show on Chicago's Municipal Pier, Sept. 14-21, has resigned. His resignation was due to pressure of other business and was filed shortly after his appointment.

Export Packing Rule Formulated

Engineer Depot Issues Suggestions Covering Machinery and War Supplies

WASHINGTON, June 24—The General Engineer Depot, War Department, suggests the following specifications for packing machinery, equipment and supplies for export orders issued by this division:

1. All merchandise must be protected by substantial boxing and must be securely packed therein. Export shipping conditions involve much rougher handling than is usually understood.
2. All packing should be as light in weight as possible and cubic contents kept to a minimum in order to economize shipping space; but the paramount consideration must always be safe handling. Brittle pine crates of half-inch board are worthless.

Limitation as to Weight

3. Packages over 1000 lb. or less than 200 lb. are to be avoided when practicable.
4. Each case or crate should be firmly bound with strap or band iron. Straps should be not less than 1 in. wide and No. 18 gage. Ends should overlap at least 6 in.
5. All lumber used in boxing and packing to be strictly sound and of such dimensions as to insure full protection under rough handling. Under no circumstances should outside boxing be less than 13/16-in. thick.
6. Packages over 300 lb. should be packed in not less than 2-in. stock, additional straps and binding to be used at every 2½ in. for boxes exceeding 3 ft. in length.
7. Boxes 600 lb. weight or over shall have 4 by 4 in. skids, top and bottom of box, securely bolted together with ⅝-in. diameter bolts, and these bolts wherever possible, should extend entirely through box. To prevent shifting, ends of box must be securely braced inside.

Lumber Preferred for Boxes

8. Use yellow pine, gum, white pine, spruce and hemlock lumber surfaced one or more sides. This gives a desirable uniformity of thickness and makes easy stenciling on more than one face of the package.
9. Use cement-coated or barbed-wire nails—eightpenny and tenpenny. This is important to make the nails hold. Not less than two in end of any board and not over 4 in. apart in wide boards. (Six-inch boards, three nails.)
10. Use corner posts in all packages.
11. Machinery itself should be covered with waterproofing paper or oilcloth to prevent damage from moisture. Machinery should be thoroughly slushed with suitable protective compound. All loose or detached parts should be firmly and securely fixed to prevent dislodgment during transit. All finished surfaces to be amply protected against injury from salt air and water.
12. Packages containing machinery, or parts, should be securely blocked in the case or crate to prevent any movement.
13. Electrical and mechanical apparatus to be solidly packed in excelsior, straw, salt hay, or other filler in a solid box with paneled ends, securely nailed and then reinforced with ⅞ by 3 in. battens around the sides at the ends, with 1-in. by No. 18 gage strap iron all the way around the battens, ends lapping at least 6 in.
14. Hardware, nails, bolts, etc., because of their weight should be packed in small cases or kegs.
15. Materials such as glassware, tools, lamps, instruments, powder, acids shall be shipped in boxes, the thickness of stock to be determined by the weight or cubical capacity.
16. Tools, instruments, or any article subject to damage by moisture shall be well wrapped in waterproof paper and boxes thoroughly lined with waterproof paper before being packed.

Tanks and Boilers in Cradles

17. Cylindrical articles such as tanks, boilers, etc., shall be shipped in cradles made of heavy timbers; the articles to be securely bolted to cradles or skids.
18. Oils, paints, and liquids shall be shipped in 50-gallon barrels or steel drums of not less than No. 16 gage or in heavy tin

containers which should be hermetically sealed and securely packed in boxes.

19. On heavy boxes sling marks to be plainly indicated on outside at the proper place, reinforcement provided to insure against damage to case.

20. All wide side pieces of flat packages should be prevented from splitting by cross-pieces nailed thereto—one in middle for 6 ft. and two for sides over 6 ft.; band iron or corner clips to top and bottom should connect at these crosspieces.

21. If new packing is tried, test boxes and crates by forcibly pushing each over the end twice. The package is then dropped from a platform 3 or 4 ft. high. The package must not be broken to any extent by this test.

Projections on Castings

22. Projecting portions of heavy castings having narrow necks must be taken off, as they will break off by jarring.

23. Gray iron extended parts must be kept one-half to one inch away from covering, as the spring of boards will cause breakage.

24. Two heavy cast pieces must not rest together, but must be cushioned or separated by wood brace or block.

25. In packing machines which are knocked down it is desirable to indicate, "Open on this side."

26. Heavy items must be firmly bolted to skids or flooring; nothing shall be hung from sides of box. Unoccupied space in packing boxes must be thoroughly braced.

27. Packages must sometimes be proportioned to facilities for handling at port.

28. In marking packages use block waterproof marking or stencil paint.

29. Put the following marks, in rectangle, on each separate box, crate, bundle, or piece, unless otherwise instructed:

Depot Req. Item No.	Foreign Req.
Order No.	Pkg. No.

Synopsis of Contents

In addition to all marks hereinbefore specified, there is to appear on each package a synopsis of the contents of same, cubic contents, gross weight, and by whom shipped.

30. Packing lists must be made out correctly and in detail with all information called for. Merchandise must be described in specific terms. Such designations as "Provisions," "Groceries," 'Canned goods," Hardware," "Machinery," or any other general terms, must not be used.

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Fuel Situation Still Indefinite

(*Continued from page* 1274)

compile a list for the distribution of coal under the following classifications:

A. Railroads.

B. Army and Navy together with other departments of the Federal Government.

C. State and county departments and institutions.

D. Public utilities.

E. Retail dealers.

F. Manufacturing plants on War Industries Board's preference list.

G. Manufacturing plants not on War Industries Board's preference list.

Domestic consumers are not classified but will rank with railroads.

The responsibility for the distribution of coal subject to this preferential list will be vested in the State Fuel Administrators.

The War Industries Board will in the main decide which consumers will have preference in securing coal, but the United States Fuel Administration is assisting by request in the compilation of the complete preference lists. Distribution of coal to consumers in the first two classes will be handled from Washington and shipments to vitally important plants not in the first two classes will be supervised by the Government.

England Plans Use of All Vehicles

Adopts Priority Scheme for Emergency Purposes—Transportation Registry

WASHINGTON, June 24—A priority scheme for emergency use of all vehicles on British roads will shortly be introduced in the United Kingdom. This provides for registration of all vehicles. A radius for transport of various merchandise, routes for all transport of merchandise, hauling rates and the conditions of transport will be defined in the bill. These new regulations and powers will be governed by a board known as the Road Transport Board of the United Kingdom, and comprise representatives of the British Government Board of Trade, the Petrol Control Department, the Horse Transport Department, Ministry of Munitions, the Ministry of Food, the Transport War Office, Upkeep of Roads War Office, Post Office and the Ministry of Reconstruction.

The general scheme is to provide and maintain an efficient system for the transport of commodities by means of motor and horse vehicles. Regulations and directions as regards the use and the sale of such vehicles will be prescribed. Authority to commandeer horses and vehicles resides with this board.

Following is the text of the regulation:

1. Where the board of trade (hereinafter referred to as the "board") is of opinion that, with a view to providing and maintaining an efficient system for the transport of goods by road (hereinafter referred to as "road transport") and using in the manner best suited to the needs of the country any horses or vehicles in use or capable of being used for the purpose of road transport, and thereby furthering the successful prosecution of the war or otherwise securing the defense of the realm, it is expedient that they should exercise the powers given to them under this regulation, the board may by order do all or any of the following things, that is to say:

(a) Regulate, restrict, or give directions with respect to the use for the purposes of road transport or the sale or purchase of any such horses or vehicles as aforesaid:

Authority to Commandeer

(b) Take possession of any such horses or vehicles as aforesaid or require them to be placed at the disposal of the board or of any person specified by the board in that behalf, either absolutely or by way of hire and either for immediate or future use.

(c) Require persons owning, or having in their possession or under their control, any such horses or vehicles as aforesaid to make to the board, or to any person specified by the board in that behalf, returns giving the prescribed particulars with respect to those horses and vehicles, and require any such returns to be verified in the prescribed manner.

(d) Require persons owning or having in their possession or under their control any such horse or vehicle as aforesaid to give notice in the prescribed manner before disposing thereof or allowing it to pass out of their possession or control.

(e) Prohibit the carriage of goods of any class by road, and prescribe the radius or distance within which goods of any class may be carried by road.

(f) Provide for the giving of directions with respect to the carriage of goods on any particular vehicles or by any particular route, or to any particular clearing house or depot.

Priority in Transportation

(g) Regulate the priority in which goods are to be carried by road and vehicles used for the purposes of road transport.

(h) Prescribe the conditions on which and the rates at which horses or vehicles may be hired for the purpose of road transport, and goods carried by road, and the conditions on which goods so carried or to be carried are to be loaded or discharged.

(i) Make such other provisions in relation to road transport as appears to the board necessary or expedient.

Compensation and Inspection

2. Any order under this regulation may be made so as to apply either generally to all horses and vehicles, or to horses and vehicles of any class, or to horses or vehicles belonging to any particular owner.

3. Such compensation shall be paid for any horse or vehicle of which possession is taken, or which is placed at the disposal of the board or of any person specified by the board, in pursuance of this regulation, as shall, in default of agreement, be determined by a single arbitrator appointed in the prescribed manner; and in determining the amount of the compensation the arbitrator shall have regard to the age and condition of the horse or vehicle, but shall not be bound to have regard to the market price of the horse or vehicle, or to the rate of hire prevailing in the district.

4. For the purpose of testing the accuracy of any return made to the board under this regulation, or of obtaining information in the case of a failure to make a return or to give any prescribed notice, any person authorized in that behalf by the board may enter any premises belonging to or in the occupation of the person who has made or has failed to make the return, or on which the person so authorized has reason to believe that any horses or vehicles with respect to which a return has been required under this regulation are kept, and may carry out such inspection and examination (including the inspection and examination of books) as he may consider necessary for testing the accuracy of the returns or for obtaining such information.

5. No individual return or part of a return made and no information obtained under this regulation shall, without lawful authority, be published or disclosed by any person except for the purpose of a prosecution under this regulation.

6. If in any case the board is of opinion that it is expedient to obtain information from any person in connection with any horses or vehicles, the board may, without making an order for the purpose, require that person to furnish them with that information. * * *

Farm Animals and Vehicles Exempted

7. The powers conferred by this regulation shall not be exercised as respects horses and vehicles used wholly or mainly in agriculture, except in connection with a preconcerted scheme to be put in operation in case of invasion or special military emergency, and nothing in this regulation shall authorize any person to sell or part with the possession of or buy any horse in contravention of regulation 2T or of the conditions of any license granted thereunder.

8. In this regulation the expression "prescribed" means prescribed by an order made under this regulation, and the expression "horse" includes mule.

9. If any person (a) acts in contravention of or fails to comply with the provisions of this regulation or of any order or requirement made thereunder; or (b) sells, removes, or secretes any horse or vehicle so as to, or with intent to, defeat, obstruct, or delay the operation of any order made under this regulation or any directions duly given in pursuance of any such order; or (c) obstructs or impedes any person authorized by the board in the exercisce of any of his powers under this regulation, he shall be guilty of a summary offense against these regulations.—Commerce Reports.

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Rockefeller Foundation Drops Labor Study

NEW YORK, June 26—Because the war has made it impossible to carry out its exhaustive study of labor conditions throughout the world, which was begun in tht fall of 1914, the Rockefeller Foundation has discontinued its reseach work in industrial relations. W. L. Mackenzie King, formerly Canadian Minister of Labor, who has conducted the inquiry for the Foundation, will publish the results of his findings as his own personal contribution to the study of labor problems.

Hercules Steel Casting Starts Milwaukee Factory

MILWAUKEE, June 24—The Hercules Steel Casting Co. of Milwaukee, organized several months ago with an authorized capital stock of $300,000, has concluded arrangements for the erection and equipment of the first unit of its new electric steel foundry plant on Robinson Avenue, in Bay View, Milwaukee. Ground will be broken this week for a brick and steel shop, 80 x 350 ft., to be equipped with a 5-ton electric furnace. The foundry will be ready to pour metal by Sept. 1 or 15. Officers of the company are: President, Joseph Ewens; vice-president, Dr. J. J. McGovern; secretary and treasurer, E. B. Gennrich. Downtown offices are maintained at 500-501 Free Press Building.

—

Buy Water Power Rights

CLINTONVILLE, WIS., June 22—Officials and stockholders in the Four Wheel Drive Auto Co. and other large industries of this city have united to buy practically the entire water power rights on the Little Wolf River, and will build a hydroelectric plant producing about 2500 hp. this year. Much of the output will be absorbed by the F. W. D. factory and the remainder by industries and municipalities in the vicinity. The F. W. D. plant is operated by steam power, and the purchase will effect a large saving of coal.

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More Room for C. A. S. Products

COLUMBUS, OHIO, June 24—The C. A. S. Products Co. has let a contract to the Austin Construction Co., Cleveland, for an additional building on its new site, 25 x 100. Rapid progress is being made by the same company on the 25 x 90 x 200-ft. building, to replace a structure recently destroyed by fire.

—

Tires Coming From Texas

HOUSTON, TEXAS, June 24—The Universal Tire & Rubber Co., which recently acquired a site of 30 acres, is having plans made for the buildings of its proposed large manufacturing plant that it will soon begin constructing. It is stated that it will manufacture tires and tubes, and that it plans to make a specialty of export business. The initial unit of the plant will give employment to about 500 men, and this will be increased to 1500 within a short time.

—

Newerf to Distribute J. & D. Tires

NEW YORK, June 21—W. D. Newerf, pioneer tire man of the Pacific coast and head of the W. D. Newerf Tire Co. of Los Angeles, has concluded arrangements to become Pacific coast distributer for the J. & D. Tire Co., Charlotte, S. C.

He will move his headquarters to San Francisco and will distribute J. & D. products throughout all territory west of Colorado, including the Pacific coast states, British Columbia and the Hawaiian Islands.

He was coast distributer for the Goodyear company from 1904 to 1911. From 1911 to 1915 he distributed the Miller Rubber Co.'s tires on the Pacific coast. Since 1915 he has done an extensive tire jobbing business throughout the Pacific territory. Under the new arrangement he will operate under the corporate name of the W. D. Newerf Tire Co.

—

More Space for Waukesha

MILWAUKEE, June 24—The Waukesha Motor Co., Waukesha, is completing erection work on three shop additions, which will be ready for service early in July and provide about 30,000 sq. ft. of floorspace additional. The company is executing large contracts with the Government for military truck engines, and its commercial truck engine business is the largest known since its inception.

—

Jorgenson Plans Extension

MILWAUKEE, June 24—The Jorgenson Mfg. Co., Waupaca, Wis., is erecting an addition to its plant and will install a new automatic screw machine, lathe and other machine tool equipment to handle large contracts for gas engine priming devices. It is hoped to reach a daily production of 1000 primers at the close of the year, contingent only upon adequate supplies of steel, brass and copper.

—

Price Changes

NEW YORK, June 24—The following changes in price have been made during the past week:

	New Price	Old Price
Chandler, 4-pass., 2 door	$1795	$1595
4-pass., 4 door	1875	1675
7-pass.	1795	1585
Coupe	2395	2195
Sedan	2495	2295
Limousine	3095	2895
Cole, 2-pass	2595	2395
4-pass.	2595	2395
7-pass.	2595	2395
Coupe	3795	2495
Sedan	3595	2795
Comet, 7-pass	1685	1285
Cunningham, 142 in. wheelbase	6000	4750
Harroun, 5-pass	995	895
Kline, 2-pass	1595	1495
4-pass.	1595	1495
5-pass.	1595	1495
Liberty, 2-pass	1485	1385
4-pass.	1485	1385
5-pass.	1485	1385
Moon, 6-36, 5-pass	1395	1295
4-pass.	2250	1985
5-pass.	2250	1985
Oldsmobile, 37, 4-pass	1295	1195
5-pass.	1295	1195
Paterson, 4-pass.	1495	1295
7-pass.	1495	1295
Saxon, 5 pass	1195	1045

Current News of Factories

Notes of New Plants—Old Ones Enlarged

Lone Star Truck Co. Purchases Factory Site

SAN ANTONIO, TEX., June 25—The Lone Star Truck & Tractor Assn. has purchased an 18-acre site here on which it will erect a factory for the manufacture of trucks, tractors and trailers. This will consist of 5 units, and 400 persons will be employed.

—

Southern Truck & Car in Production

GREENSBORO, N. C., June 25—The Southern Truck & Car Corp. will start the distribution of motor cars and trucks shortly. The company, which was organized in April, was originally styled Guilford Motor Truck Co.

—

Iowa Motor Truck Organized

OTTUMWA, IOWA, June 25—The Iowa Motor Truck Co. has been incorporated here with a capital stock of $15,000 by H. L. Bell, O. L. Canning and H. B. Simmons. The organization will manufacture converters for Ford, Dodge Brothers and other makes of cars. H. L. Bell has been elected president and H. H. Cannon is manager of the Western division.

—

War Department Awards Contracts

WASHINGTON, June 21—The following awards have been made by the War Department, General Engineering Depot:

June 12-13, 1918

Russell Grader Mfg. Co., Minneapolis, road plows.

Studebaker Corp. of America, Detroit, automobile parts.

Wheeler-Schebler Carburetor Co., Indianapolis, carbureters.

Dodge Bros., Detroit, motor parts.

Foos Gas Engine Co., Springfield, Ohio, gasoline engines.

International Motor Co., Washington, spare parts for trucks.

—

Grinding Liberty Airplane Engine Cylinders

In the article on Grinding Liberty Engine Cylinders, which appeared in the June 20 issue—the War Engineering Number—of AUTOMOTIVE INDUSTRIES, owing to an unfortunate error, the address of the Heald Machine Company was given as Springfield, Mass., instead of Worcester, Mass., as it should have been.

The article referred to pointed out how the new problems which have been encountered in grinding the thin steel cylinders of the Liberty engine have been overcome, and described the special jig which has been developed by the Heald Machine Company for use in connection with the standard Heald No. 60 cylinder grinder, which is used for the work. The Heald Machine Company has been manufacturing grinding machinery for many years, and its plant is located in Worcester, Mass., and not in Springfield, as was stated in the article.

Men of the Industry

Changes in Personnel and Position

D. N. Mason Vice-President of Mason Tire & Rubber Co.

KENT, OHIO, June 24—At a recent meeting of the board of directors of the Mason Tire & Rubber Co. D. N. Mason was elected vice-president.

—

T. E. A. Barthel, formerly general manager of the King Motor Car Co., Detroit, has become associated with the Curtiss Aeroplane & Motor Corp., Buffalo, and his duties will have to do with the finances of the corporation.

—

C. E. Havens has been appointed service manager for the King Motor Car Co., Detroit, succeeding George C. Gurney, who recently resigned to accept a similar position with the Scripps-Booth Corp., Detroit. Mr. Havens was formerly service manager for the Hudson Motor Car Co. and later assistant general manager of the Bemb-Robinson Co., Detroit Hudson dealers. The duties of the general sales manager's office of the King company are now being handled by Robert T. Walsh, assistant sales manager.

—

W. T. Woodrow has been appointed general manager of the Manitowoc (Wis.) plant of the Aluminum Castings Co., with main offices in Cleveland, Ohio, to succeed Howard Emery, who some time ago was promoted to the position of general manager of the plant at Detroit. Charles H. Seegitz, assistant manager at Manitowoc, has been transferred to the purchasing department at Cleveland, and is succeeded by L. H. Gleason.

—

J. W. DeCou has been appointed factory manager of the Ross Gear & Tool Co., Lafayette, Ind. He was for 8 years factory manager for the Thomas B. Jeffery Co., Kenosha, and 2 years factory manager for the Smith Form-A-Truck Co., Chicago.

—

E. B. Moon, who was formerly director of sales of a large wholesale house, has been appointed sales manager and advertising manager for the Columbus Tractor Co., Columbus, Ohio.

—

C. W. Waughop, formerly Eastern district manager of the Rainier Motor Corp., New York City, has joined the wholesale forces of the Hurlburt Motor Truck Co., of the same city, to cover Pennsylvania and Ohio territory.

—

Charles E. Wells has been appointed manager of the Philadelphia branch of the Oakland Motor Car Co., Pontiac. He has been assistant branch manager of the Oakland Omaha branch for the past year, previous to which time he was a branch manager for the John Deere Plow Co.

—

Elmer H. Hohenthal has been appointed manager of the Detroit sales and service branch of the Eisemann Magneto Co. He was formerly associated with the Bosch Magneto Co. and the Simms Magneto Co.

—

R. C. Getsinger, formerly sales manager of the Saxon Motor Car Corp., Detroit, has been elected vice-president of the William N. Albee Co., Detroit. James Strasburg, formerly with the American Electrical Heater Co., Detroit, has been appointed sales manager of the Albee company.

—

Frank A. Hayes has been promoted to the position of chief engineer of the aircraft division of Willys-Overland, Ltd., Toronto, Canada. He joined the organization last year, and prior to that was associated with the Cadillac Motor Car Co.

—

H. J. St. Aubin, for several years traffic manager of the Federal Motor Truck Co., Detroit, has resigned to enter Government service at Camp Custer, Mich.

—

W. I. Brown, formerly sales manager of the Scripps-Booth Corp., Detroit, has become Eastern district sales manager for the Cleveland Tractor Co., with headquarters in Cleveland.

—

P. L. Barter, sales manager for the McCord Mfg. Co., Detroit, has been promoted to the position of second vice-president. He has been with the McCord company since its organization nearly 10 years ago.

—

No Tire Exports from Canada

OTTAWA, CANADA, June 25—Exportation of tires containing rubber has been prohibited except in cases where a special license is issued by the Minister of Customs on the approval of the War Trade Board.

—

Erd Motor Personnel Changes

SAGINAW, MICH., June 25—The Erd Motor Co. has made several additions to its personnel. Theodore A. Peck, formerly associated with the Westinghouse and Locomobile companies, has been appointed sales manager. Charles M. Wallace, for the last 2 years director of purchases of the Mitchell Motors Co., Inc., has become manager of the purchasing department. A. W. Redlin, formerly division superintendent of the Mitchell Motor Car Co., is now assistant works manager of the Erd company, and Clem Jackson, who was also associated with the Mitchell organization, is assistant chief engineer.

New Companies Formed

Latest Additions to Ranks of Automotive Industries

Acme Motor Parts Co. Is Organized in Milwaukee

MILWAUKEE, WIS., June 24—The Acme Motor Parts Co. of Milwaukee has been organized with a capital stock of $25,000 by William Smulski, president and manager of the Sterling Metal Parts Co., Eighth and Oklahoma Avenues, and will engage in the manufacture of motor car, truck, airplane and tractor parts, accessories and devices. Joseph Mietus and William P. Doucette are associated with Mr. Smulski in the new enterprise.

—

Tractor Parts Co. Organized

CLEVELAND, June 21—The Tractor Parts Co. has been incorporated for $500,000 by S. H. Tolles, John M. Garfield, R. C. Hyatt, Ralph Burroughs and Thomas H. Jones. One of the officials of the company will be J. O. Eaton, treasurer of the Torbensen Axle Co., Cleveland.

—

Propellers Coming from Milwaukee

MILWAUKEE, June 24—A large plant for the manufacture of propellers for airplanes, hydroplanes and similar craft has been established in Milwaukee by the United States Aero Propeller Co., organized by the same interests owning and operating the Great Lakes Boat Building Corp., manufacturing light, gas-engine driven scouting cruisers and other power boats. W. C. Morehead is president and general manager of both companies, which jointly occupy the boat works and shops at 333 Becher Street, Milwaukee. The new company is working on large Government contracts both for the army and navy departments.

—

Fibre Finishing Addition

BOSTON, June 25—The Fibre Finishing Co., manufacturer of Vellumoid packing and gaskets, is completing an addition to its plant. This will be used for additional cutting machines for the gasket department.

—

New Plant for Corcoran Mfg. Co.

CINCINNATI, June 25—The new plant of the Corcoran Mfg. Co., manufacturer of fenders, radiators, tool boxes, tire pumps and sheet metal parts for automobiles, will be in operation by Aug. 1. About 400 men will be employed.

—

Enlarges J. & D. Sales Territory

ATLANTA, GA., June 25—C. C. Codington, distributer of J. & D. tires in the Carolinas, will also distribute them in Florida and Georgia. He has opened a branch here to cover the new territory.

AUTOMOTIVE MATERIALS MARKETS

Acids:
Muriatic, lb. ..... .02-.03
Phosphoric, lb. ..... .35-.39
Sulphuric (60), lb.. .15-.17½

Aluminum:
Ingot, lb. ..... .33
Sheets (18 gage or more), lb. ..... .40

Burlap:
8 oz. yd..... .18¾
10 oz. yd..... .23¼

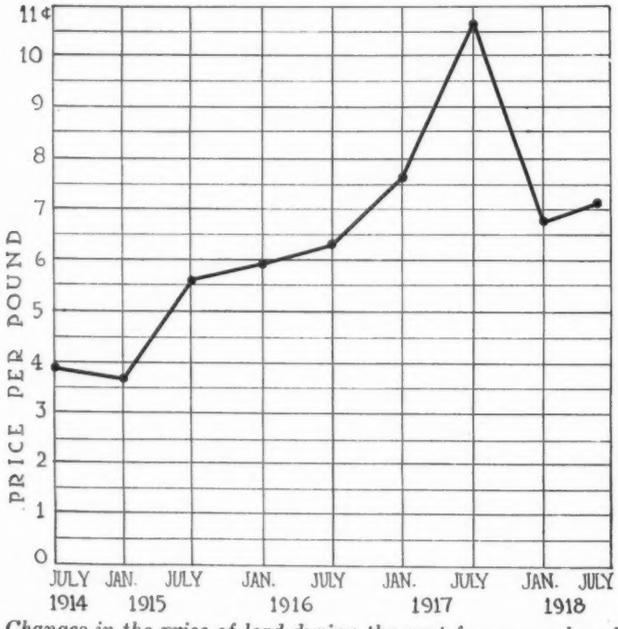
Copper:
Elec, lb. ..... .23½
Lake, lb. ..... .23½

Fabric, Tire (17¼ oz.):
Sea Is., combed, lb. 1.65-1.70
Egypt., combed, lb. 1.20-1.30
Egypt, carded, lb.. 1.15-1.25
Peelers, combed, lb. 1.05-1.20
Peelers, carded, lb.. .95-1.05

Fibre (⅛ in. sheet base), lb. ..... .45

Graphite:
Ceylon, lb. ..... .07½-.25
Madagascar, lb. ... .10 -.15
Mexican, lb. ..... .03½

Lead, lb. ..... .07¾-.08⅛



Changes in the price of lead during the past four years based on the monthly average of daily New York quotations

Leather:
Hides, lb. ..... .19-.33

Mica:
India:
Grade 4, lb.....3.00
Grade 5, lb.....1.50
Amber:
Grade 4, lb.....1.25
Grade 5, lb..... .65

Oil:
Gasoline:
Auto., gal. ..... .24
68 to 70 gal..... .30
Lard:
Prime City, gal..2.20
Ex. No. 1, gal...1.45
Linseed, gal.....1.65
Menhaden, gal.....1.05
Petroleum (crude):
Kansas, bbl.....2.25
Pennsylvania, bbl. 4.00

Rubber:
Ceylon:
First latex pale crepe, lb. ..... .63
Brown, crepe, thin. clear, lb. ..... .60
Smoked, ribbed sheets, lb. .... .62
Para:
Up River, fine, lb. .68
Up River, coarse, lb. ..... .40
Island, fine, lb... .59
Island, coarse, lb. .27
Caucho ball, upper, lb. ..... .40
Caucho ball, lower, lb. ..... .36

Shellac (orange), gal. .65-.70

Soda, caustic, lb.... .04-.05

Solder:
Half and half, lb.. .65
No. 1, lb..... .60
Refined, lb. ..... .47

Steel:
Angle beams and channels, lb. .... .03
Automobile sheet (see sp. table.)
Cold rolled, lb..... .06½
Hot rolled, lb..... .03½

Waste (cotton), lb.. .12¾-17

AUTOMOBILE SHEET PRICES

(Based on No. 22 Gage. Other gages at usual differentials)

	Primes only. Per 100 lb.	Primes when seconds up to 15 per cent are taken Per 100 lb.	Seconds arising.
Automobile body stock	$5.95	$5.85	*See Note
Automobile body stock, deep stamping	6.20	6.10	
Automobile body stock, extra deep stamping	6.45	6.35	
Hood, flat fender, door and apron, or splash guard stock	6.05	5.95	
Crown fender, cowl and radiator casing, deep stamping	6.30	6.20	
Crown fender, cowl and radiator casing, extra deep stamping	6.55	6.45	

Automobile Sheet Extras for Extreme Widths:
Nos. 17 and 18 over 36 in. to 44 in., 10c. per 100 lb.
Nos. 19 to 21 over 36 in. to 44 in., 30c. per 100 lb.
Nos. 22 to 24 over 36 in. to 40 in., 40c per 100 lb.
Nos. 22 to 24 over 40 in. to 44 in., 80c. per 100 lb.
Black sheet extras to apply on narrow widths.
Oiling, 10c. per 100 lb.
Patent leveling, 25c. per 100 lb.
Resquaring, 5 per cent of gage price after quality, finish and size extras have been added.

*Ten per cent less than the invoice Pittsburgh price for corresponding primes.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	57	60	..
*J. I. Case T. M. Co., pfd.	80	86	..
Chalmers Motor Co., com.	5	6	..
Chalmers Motor Co., pfd.	30	40	..
*Chandler Motor Co.	82	84	—4
Chevrolet Motor Co.	129	132	—3
*Fisher Body Corp., com.	39	41	+2
*Fisher Body Corp., pfd.	87	89	+1½
Fisk Rubber Co., com.	53	57	..
Fisk Rubber Co., 1st pfd.	98	102	..
Fisk Rubber Co., 2nd pfd.	77	84	—1
Firestone Tire & Rubber Co., com.	89	91	..
Firestone Tire & Rubber Co., pfd.	93	95	..
*General Motors Co., com.	138	141	+6
*General Motors Co., pfd.	81	82	— ½
*B. F. Goodrich Co., com.	45	45½	+1
*B. F. Goodrich Co., pfd.	98	98¼	—1¾
Goodyear Tire & Rubber Co., com.	150	160	—10
Goodyear Tire & Rubber Co., pfd	97	99	—1
Grant Motor Car Corp.	2¾	3	— ½
Hupp Motor Car Corp., com.	2¾	3	..
Hupp Motor Car Corp., pfd.	79	85	..
International Motor Co., com.	30	35	..
International Motor Co., 1st pfd.	56	62	—3
International Motor Co., 2nd pfd.	38	43	—2
*Kelley-Springfield Tire Co., com.	50	50½	+2
*Kelly-Springfield Tire Co., 1st pfd.	79½	87	..
*Lee Rubber & Tire Corp.	18½	19	+ ⅛
*Maxwell Motor Co., Inc., com.	28	28¼	+ ¼
*Maxwell Motor Co., Inc., 1st pfd.	54	56	+2
*Maxwell Motor Co., Inc., 2nd pfd.	19	21	+1
Miller Rubber Co., com.	99	101	..
Miller Rubber Co., pfd.	90	92	—3
Packard Motor Car Co., com.	109	116	..
Packard Motor Car Co., pfd.	93	96	+1
Paige-Detroit Motor Car Co.	15	17	..
Peerless Truck & Motor Corp.	14	17	..
Portage Rubber Co., com.	100	102	—4
†Reo Motor Car Co.	13	15	+ ½
*Saxon Motor Car Corp.	8	9	+1
Springfield Body Corp., com.	..	..	..
Springfield Body Corp., pfd.	..	..	..
Standard Motor Construction Co.	11¾	12¼	— ¼
*Stewart-Warner Speed. Corp.	57½	58½	+ ½
*Studebaker Corp., com.	45	45½	—1½
*Studebaker Corp., pfd.	85	90	..
Swinehart Tire & Rubber Co.	50	65	+23
United Motors Corp.	29½	30½	+2
*U. S. Rubber Co., com.	58¼	58¾	— ¼
*U. S. Rubber Co., pfd.	103¼	103¾	+ ¾
*White Motor Co.	41½	42½	+ ½
*Willys-Overland Co., com.	20⅜	20⅝	+ ⅛
*Willys-Overland Co., pfd.	81½	83	..

*At close June 22. Listed N. Y. Stock Exchange. †Par value $10.00.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	7¾	..
Bower Roller Bearing Co.	16¼	17¾	..
Chevrolet Motor Co.	..	..	..
Commerce Motor Car Co.	..	10¼	..
Continental Motor Car Co., com.	5¼	5⅜	..
Continental Motor Car Co., pfd.	92¾	96	+ ¼
Edmunds & Jones, com.	14	17	..
Edmunds & Jones, pfd.	80	90	..
Ford Motor Co. of Canada	178	..	+4
Hall Lamp Co.	..	..	..
Michigan Stamping Co., com.	12¾	..	..
Motor Products	..	..	..
Packard Motor Car Co., com.	113	..	+4
Packard Motor Car Co., pfd.	93¾	96	+ ¾
Paige-Detroit Motor Car Co.	19	19½	..
Prudden Wheel Co.	..	12⅛	..
Reo Motor Car Co.	13½	..	— ⅛

INACTIVE STOCKS

Atlas Drop Forge	..	26	..
Kelsey Wheel Co.	90	92	..

Industrial Review of the Week

A Summary of Major Developments in Other Fields

Production of Hard and Soft Coal Improving

An analysis of coal-market conditions the past week discloses nothing of a startling nature. The competitive features which in former years dominated the news and added the spice of variety to the task of the reviewer are lacking in these days of Government regulation and administration. The statement that "Demands for all kinds of coal are urgent with stock inadequate," though somewhat stereotyped by now, is nevertheless as true this week as it has been for weeks past.

The impetus given to coal production by the pulling together of the railroad and fuel administrations was reflected in the truly wonderful accomplishment of the bituminous coal mines during the week ended June 15, when 12,571,000 short tons of soft coal were mined. This output breaks all previous records and is deserving of more than passing notice when it is considered that a serious car shortage still exists; that thousands of experienced miners have been taken by the draft, and that labor conditions in general are in a demoralized state.

Anthracite production for the week under review totaled 41,960 carloads, the best showing that has been made in many weeks. The labor problem at the hard-coal mines continues to cause much uneasiness, as this branch of the industry is losing men at the rate of 2000 monthly. Steps are being taken to have the Government give relief to a condition which promises to become critical unless the proper remedies are applied speedily.

While the tonnage of anthracite for May was but slightly less than the quantity shipped in May, 1917, yet it must be emphasized that the increase in steam sizes produced from banks—or culm piles—was the only thing that kept the aggregate production near that figure. The output of fresh-mined coal will continue to diminish just as long as labor at the mines diminishes.

Many of the larger operators are now shipping their entire output to the lakes, thus necessarily reducing the stocks available for steam and domestic use. The vessel movement is generally good, and a considerable tonnage is going to the Northwest. On the whole, however, shipments are behind schedule, principally because of the late opening of navigation.—*Coal Age.*

—

Development of a Heavy Oil Engine

(*Continued from page* 1269)

In the stationary field about fifty-five thousand horsepower of engines of this type is in use and about five thousand horsepower is being produced each month. Its manufacture for automotive transportation purposes promises to become a matter of great interest to the members of this society.

Burning any liquid hydrocarbon, it can make use of the cheaper products of the refinery, or even liquid tar, the waste product of coke-oven plants. Kerosene, which is found at almost every crossroads store in the world, at a price but little more than that of fuel oil, makes an ideal fuel for these engines on account of its cleanliness and availability. In an engine of this type there is no defective ignition with normal compression; therefore, no free fuel will reach and vitiate the lubricating oil in the crankcase.

With a combustion in every cylinder, irrespective of the load, carbon will not be deposited, for burning the carbon out is a continuous performance. With a heavy fuel the danger of fire is greatly reduced, and when this constant-compression engine is applied to airplanes we will seldom read of aircraft descending in flames. By reducing fuel consumption one-half, even should the price of fuel oil and kerosene reach that of gasoline, there would be effected a saving of the greatest magnitude.

—

Drop Forge Men in Convention

(*Continued from page* 1271)

early days piston rods were made from ordinary machinery steel, and the breakage of a rod was an ordinary occurrence. Lately the best grades of alloy steel are being used, and rod breakages have been greatly reduced in consequence. In substantiation of this statement Mr. Stebbins said that at the Cleveland plant of the Wyman & Gordon Co., where there are 15 steam hammers in operation, only six rods broke during the past year.

Considerable trouble has been caused by the piston rings breaking and the pistons becoming jammed in the cylinder. The Wyman & Gordon Co. has recently been using steam packing on the pistons instead of steel rings, and up to date this packing has been giving very good results. Another innovation made was a central oiling system for all of the hammers. This comprises a steel tank having a capacity of about a barrel of cylinder oil. This is placed under air pressure, whereby the oil is forced to the individual cylinders, and the feed to each cylinder is controlled by a valve. In regard to piston rods, some rods were riveted to the pistons, in which case the most important point is that the taper of the rod must correspond absolutely to the taper of the piston.

A. V. Farr of the Hess Steel Corp. read a paper on "Electric Steel Making Essential to the Forging Industry." Mr. Farr drew a distinction between the two electrical methods used in producing steel, the cold melt process and the electric refining process. W. R. Hurlbert of the Metal & Thermit Corp. displayed moving pictures showing thermit welding.

During the afternoon session J. T. N. Hoyt of Albert Kahn, architects and engineers, spoke on forge shop construction. T. F. Baily, president of the Electric Furnace Co. of America, on "Electric Furnaces for Heat Treatment of Forgings," and T. C. Powell of the Priorities Division of the War Industries Board on "The Present System of Priorities."

E. J. Frost of the Frost Gear & Forge Co., Jackson, Mich., was elected president of the American Drop Forge Assn. and H. N. Taylor of Philadelphia was re-elected president in the Drop Forge Supply Assn.

Little Objection to Increase on Lake Superior Ore

The price conference at Washington last Friday moved on the lines of least resistance in raising Lake Superior ore 45c. per ton and reaffirming existing prices on pig iron and finished products for three months from July 1. It was made plain that the ore advance was absorbed by the new higher freight on ore and by other new railroad charges, and that higher labor cost was not compensated.

A minority of smaller producers of pig iron is disappointed that its claims for an advance were not urged by the general iron and steel committee, and an occasional note of protest has gone up in other quarters. But the larger interests, before the conference met, had accepted the well-understood Washington view that pig iron and finished steel prices should not be disturbed.

A special sub-committee appointed by the Price Fixing Committee will now take up with the steel trade the fixing of prices on steel rails, steel and malleable castings, wire rope and some other products. No price has been fixed on rails thus far because the railroads wanted none; now the roads are asking for it. Rail requirements for operations in France the coming year have been put as hign as 275,000 tons.

An interesting war development from the foundry standpoint is that the Ordnance Department has framed a specification for semi-steel projectiles.

With no definite system of pig-iron priorities, furnace companies are making shipments largely to foundries working in essential lines. Contract deliveries are going by the board in many cases and other foundries designated from Washington are getting iron. England's order for 180,000 tons of basic iron, to be shipped in September, October and November, is likely to be divided between the North and the South. If silicon tolerance is raised to 1.25 per cent the South can take more, with the advantage of shipping from Southern ports. —*Iron Age.*

Chevrolet Victor in Chicago Derby

In Frontenac Travels 100 Miles at Rate of 108 M. P. H.—Breaks De Palma's 1916 Record

CHICAGO, June 26—Louis Chevrolet captured premier honors in the fourth annual Chicago Automobile Derby today, when in a hotly contested race he won the 100-mile event which featured the day's program at a speed of nearly 108 m.p.h. His Frontenac travelled the century in 55 min. 29.6 sec., an average of 107.9 m.p.h., breaking the previous Chicago 2-mile speedway record for the distance of 55 min. 50 sec. made by De Palma in a Peugeot 2 years ago.

Mulford in another Frontenac took second, finishing 1 min. 38 sec. behind Chevrolet, with Vail's Hudson third nearly a minute later.

The other five to register on the timer at the finish followed in the order named: Hickey in a Hudson, Oldfield in his Oldfield Special, Alley in the Bender, Milton in a Duesenberg and De Palma in his Packard.

The 100-mile event was preceded by a 10-mile handicap run in three heats which turned up Resta as the winner, his time being 5 min. 33.1 sec. Chevrolet got second and Oldfield third in the final. The two preliminary heats went to Resta and Chevrolet.

Between the two events De Palma put his Packard around the 2-mile board track in a successful trial for the track record for one lap at 116 m.p.h., bettering the previous Chicago record of 113 m.p.h. for the track set up by Resta 2 years ago.

With two track records to his credit the meet can be considered a speed success. Chevrolet's time for the hundred miles is not so good as the record he established at Sheepshead Bay last fall, so no new American records were made. But Chevrolet now holds not only the American record for the distance but the Chicago track mark as well.

To-day's race proved the possibility of getting out a big crowd even in these war times. But it was only done by adopting baseball tactics of popular prices and late starting.

That these arrangements were wise was shown by the fact that fully 40,000 attended, a crowd exceeded only once at the speedway, and that the day the track was inaugurated 3 years ago. Over half the track was lined with double rows of cars in the infield, the biggest turnout of cars ever seen at one time in Chicago.

It is doubtful if another such crowd could be gotten out for another handicap 100-mile race, for with fifteen contestants it is hard enough for the grandstands to follow the fortunes of the individual drivers without, as in this case, starting them out at different times. With the scoreboards two laps or more behind, as is inevitable on a 2-mile speedway, the difficulties of keeping track of the contestants are increased and the interest is lost. Before De Palma, the scratch man, started, the slower cars had made a lap, and so from the start cars were strung around the entire 2-mile circuit and the spectacle of a flying start was lost as was the struggle for early leadership among the fast cars.

The timing and management of the race as a whole seemed to be excellent. The scoreboards were behind and inaccurate as usual and the announcing was much too infrequent and sparse in information.

De Palma played in hard luck. The favorite of the grandstands and scratch man in the handicapping started fifteenth; therefore the Italian had his Packard by the end of 14 miles up into sixth place and was making the best speed. Then his jinx got him and he spent nearly 4 min. at the pits changing spark plugs. When he got under way he reeled off the laps at 109 and 110 m.p.h. But the others had gained too much and toward the last his speed seemed to tell, for Chevrolet and Mulford during the last quarter maintained their distance.

Resta lost to-day his distinction of never having lost a race on the Chicago track. He was given 30 sec. start over De Palma and was climbing into the lead when after the first 30 miles he stopped to change plugs. Later he made a second stop with a broken accelerator spring and a third and final when he withdrew with oiling trouble.

The specially imported Duray, holder of the world's straightaway record, also ran, but not well enough to show. He was never a factor.

Times for 100-Mile Race

Handicap Seconds	Driver	Time	M.P.H.
15	Chevrolet	55:29.6	108.12
20	Mulford	57:07.2	105.04
75	Vail	58:14.0	103.03
70	Hickey	58:37.0	102.36
40	Oldfield	58:55.0	101.87
50	Milton	59:35.0	100.69
22	Alley	59:36.0	100.67
00	De Palma	.....	.....

Dealers After Big Membership

Committee Visits Washington to Take Up Proposed Tax on Cars—Meetings Scheduled

NEW YORK, June 20—The National Automobile Dealers' Assn., which has launched a campaign for 5000 members in 90 days, has scheduled meetings and campaigns in many sections of the United States.

The Chicago distributers have named 100 county committees to obtain members in Illinois, and several of the largest cities in the United States have come into the organization with all the dealers in their local associations. A mass meeting is planned for Monday, July 1, at 12.30 noon, at Reisenweber's, where the dealers of Greater New York and the outlying towns within 100 miles will be addressed by President F. W. A. Vesper of the national association.

President Vesper and a committee of dealers from various cities are to-day before the Ways and Means Committee of the House of Representatives telling how proposed taxation will affect the trade. An effort is to be made to have taxes applied to all the 5,000,000 cars in use rather than an excessively high tax to new car sales only.

Following the hearing in Washington, Vesper and E. E. Peake, the new executive secretary of the association, will attend a meeting of the Pittsburgh dealers Thursday night and a meeting of the Harrisburg dealers Friday night. Philadelphia will hold a meeting July 2.

Many other cities are arranging meetings and getting behind the movement with enthusiasm.

Philadelphia Return Loads Bureau Growing

PHILADELPHIA, June 25—The Return Loads Bureau of the Philadelphia Chamber of Commerce has registered the names of 150 owners of motor freight trucks doing intercity hauling. Indications are that this city is to become the distributing point for an increasingly wide manufacturing and agricultural area.

Porto Rico Controls Gasoline

SAN JUAN, PORTO RICO, June 25—The Insular Food Commission has taken control of all gasoline on the island and has fixed a maximum price of 55 cents a gallon. No more than 5 gallons may be sold to one consumer at the same time.

Calendar

RACING

July 4—Cincinnati. Cincinnati Speedway.
July 4—Tacoma, Wash. Tacoma Speedway Assn.
July 27 — Chicago. Chicago Speedway.
Aug. 3—Uniontown. Uniontown Speedway Assn.
Aug. 10—Providence, R. I.
Aug. 17—Sheepshead Bay.
Sept. 2—Uniontown. Uniontown Speedway Assn.
Sept. 7 — Chicago. Chicago Speedway.
Sept. 21—Sheepshead Bay.
Oct. 5—Cincinnati. Cincinnati Speedway.

SHOWS

July 29-Aug. 4—Salina, Kan. National Tractor Demonstration. Auspices of National Implement and Vehicle Assn.
Sept. 23-28—Chicago, National Accessory Show for Fords. Coliseum.
Oct. 14-27—Dallas, Tex. Seventh Annual Texas Automobile Show. Texas State Fair.

ENGINEERING

June 26-28 — Buffalo, N. Y. American Society of Heating and Ventilating Engineers.
Sept. 2 — Cripple Creek, Colo. American Institute of Mining Engineers.
Nov. 14-15—New York. Society of Naval Architects and Marine Engineers. Twenty-sixth general meeting. Engineering Societies Bldg., 29 West 39th Street.

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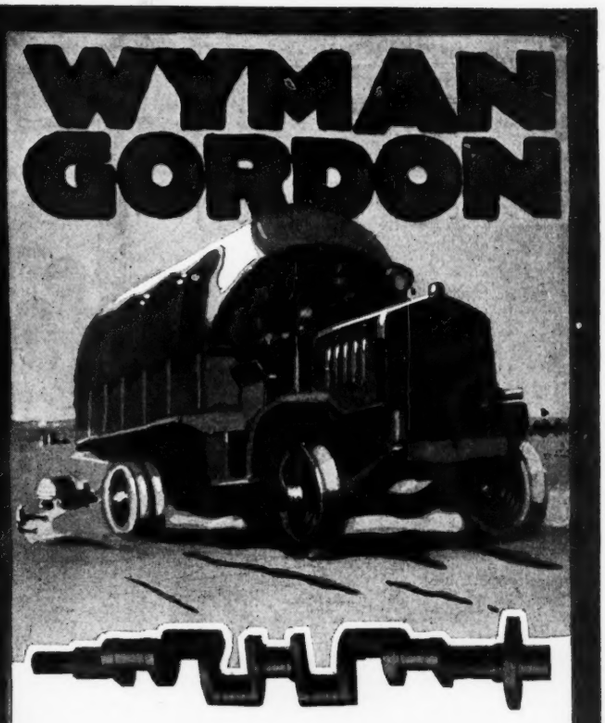

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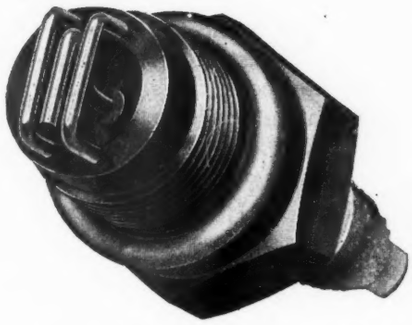

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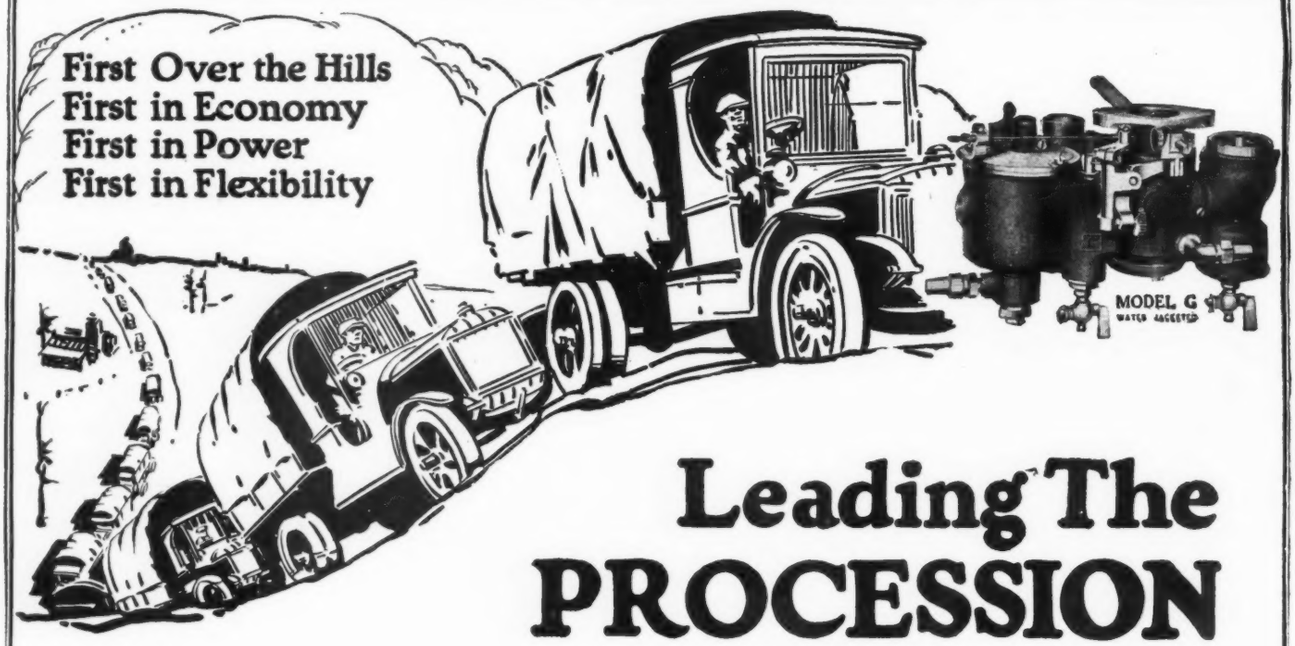

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DEALERS

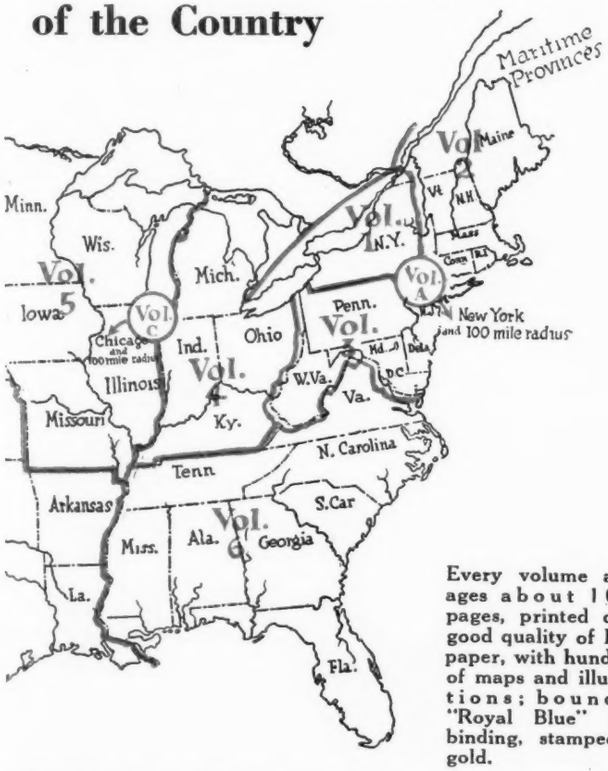
Thousands of garages and accessory dealers now realize the opportunity the Automobile Blue Book presents to them, not only as $3.00 sales—with a profit of $1.00 or more on every copy—but also as the means of selling other car and touring equipment.

Motorists who tour are in a buying mood. They need a lot of things. They buy most of them before they start—right when they buy their Automobile Blue Book.

One hundred and twenty-five thousand copies of this Standard Road Guide of America were sold in 1917.

If you are not selling the 1918 Automobile Blue Book you are depriving yourself of many $3.00 sales—and also of many other good sales that you should and could have. Now—today—write for full particulars.

A Volume for every Section of the Country



Every volume averages about 1000 pages, printed on a good quality of India paper, with hundreds of maps and illustrations; bound in "Royal Blue" limp binding, stamped in gold.

Book Publishing Co.
New York, N. Y.

513 Pacific Bldg.
SAN FRANCISCO

EAST

Blue Book Scout Car No. 4

16,662 Hours Without a Stop at 25 Miles an Hour

If one Blue Book Scout Car attempted to cover all the roads minutely described in the 1918 Automobile Blue Book—it would have to travel 16,662 hours without a second's stop at twenty-five miles an hour. That's nearly two years of continuous running! But there is not one, but ten Blue Book Scout Cars constantly on the road. The Automobile Blue Books are right up-to-date. Not a mile of road goes into the Blue Book unless it has been charted first by a Blue Book Scout Car.

WEST

Blue Book Scout Car No. 1

The telephone company has just printed a list of men who are going to buy Maxwell trucks

Open the directory and pick out the "butchers and bakers and candle-stick-makers"—get the Maxwell truck agency; bring 'em 'round for a "once-over"—have your order blank handy—say "sign here" and begin to figure your excess profits tax.

Here's a truck with the guts and go of $5000 kinds: worm drive—electric lights and generator—ten-foot loading space—a gas and tire miser and a mile glutton. Retails at $1085—several hundred dollars less than any other truck of similar capacity on the market.

Sherlock Holmes, the balance sheet, has discovered that over-sized, unnecessarily heavy, three- and five-ton trucks are bad buys; they carry too many half loads—eat their heads off and make the repair shops rich.

Land the Maxwell for your territory and learn what real money-making means—sight sales—net profits—repeat orders and no come-backs. The mails are uncertain nowadays—telegraph "Yes" before the "other man" beats you to it.

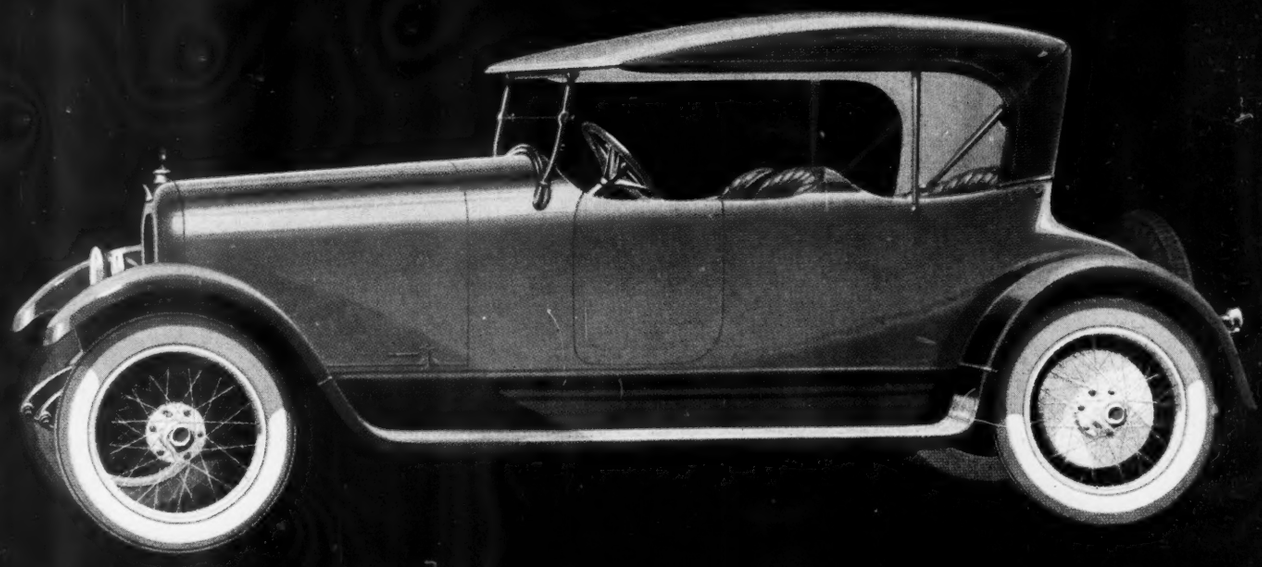
MAXWELL MOTOR COMPANY, Inc., DETROIT, MICH.

MARMON
34

"I DIDN'T begin with askings. I
took my job and stuck;
I took the chances they wouldn't,
an' now they're calling it luck.
And they asked me how I did it,
and I gave 'em the Scripture text,
'You keep your light so shining a
little in front o' the next!'
They copied all they could follow,
but they couldn't copy my mind,
And I left 'em sweating and stealing
year and a half behind."

—Rudyard Kipling in "The Mary Gloster"

NORDYKE & MARMON
COMPANY
Established 1851
INDIANAPOLIS



MARMON
34

136-Inch Wheelbase

THE New Series 4-Passenger Roadster has America's approval because it conforms to America's program of unremitting service conducted with purposeful economy. Advanced Engineering, 1290 less parts, 1100 pounds less weight, 40 to 50 per cent more mileage from tires, 50 to 75 per cent more miles from fuel.

NORDYKE & MARMON COMPANY
Established 1851 : INDIANAPOLIS

PRACTICALLY all the representative automobile engineers depend on Victor Lamps for regular equipment because they have confidence in Victor design and construction and approve of Victor style and Victor finish.

Since the first days of the automobile industry, the Victor manufacturers have made the best lamps that could be produced. Their constant aim has been to make the Victor product worthy of the confidence of those building dependable cars.

As the motor car approached more nearly to perfection the Victor product kept pace with it and blazed the way to practically every advance in lamp construction and lamp beauty.

The continuous effort to keep Victor Lamps beyond competition, plus prompt deliveries and fair prices has won and held for them acknowledged leadership in the automobile lamp field.

Victor
TRADE MARK

LAMPS

The Corcoran Victor Company
713 Reading Boulevard Cincinnati, Ohio

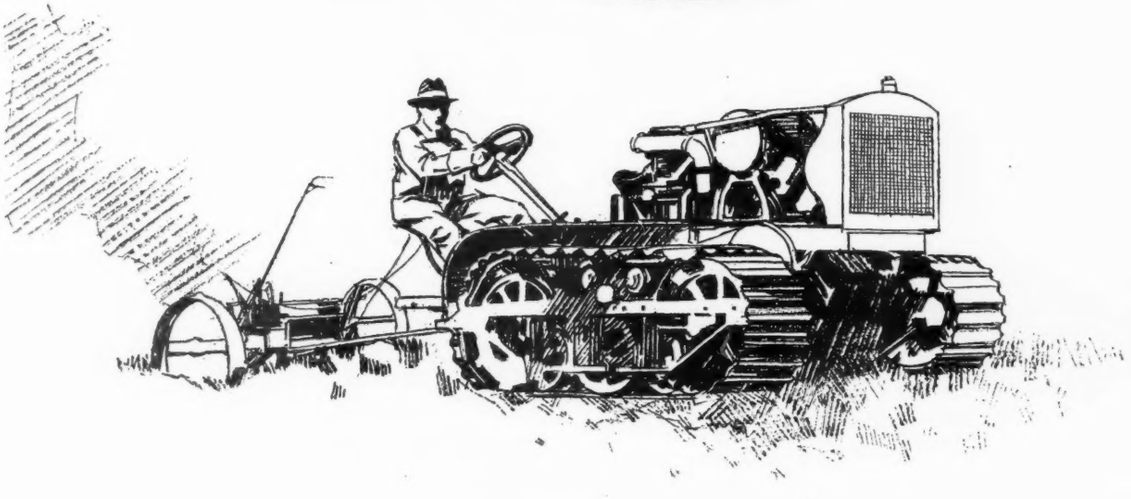
Most bearing demands call for the deep groove, sturdy construction found in Strom Bearings.

And not only must the grooves be deep—but the raceways must be free from notches and of uniform depth on either side of the groove.

This design, combined with big husky balls, provides life and capacity in maximum degree.

U. S. BALL BEARING MFG. CO.
(Conrad Patent Licensee)
CHICAGO, ILLINOIS

STROM
Strom
BEARINGS
FORMERLY U.S. BALL BEARINGS



When Your Spring Breaks Put On

VULCAN QUALITY
The Replacement Spring

That's the message now being carried to millions of car-owners through the pages of National publications such as:

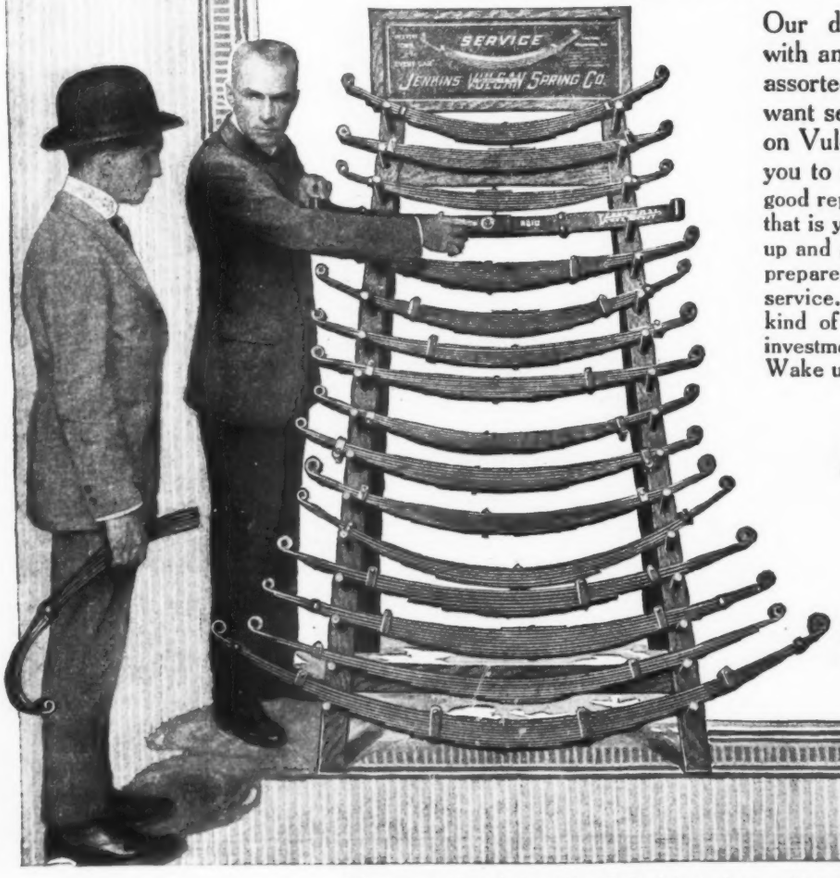
Saturday Evening Post,
Colliers Weekly,
Leslies Weekly,
Automobile Blue Book
and all Trade Papers.

To Dealers: You **need** this display rack full of **quick-selling,** replacement Vulcan Springs—and you need it **now.**

If you are one of the 3,000 live dealers who already have it, see that your stock is complete. Order what is short.

Here is something you want—

Real Profit With Small Investment



Our display rack is FREE to you with an order for one dozen or more assorted Vulcan Springs. Owners want service. They are already sold on Vulcan Springs. Now it's up to you to cash in on this advertising and good reputation and pocket the big profit that is yours. When the car owner drives up and asks you to "put on Vulcan"—be prepared. He wants **service**—real service. Give it to him. You need this kind of profit that requires no growing investment. Vulcan Springs move fast. Wake up!

Write Today for Our Spring Rack Proposition.

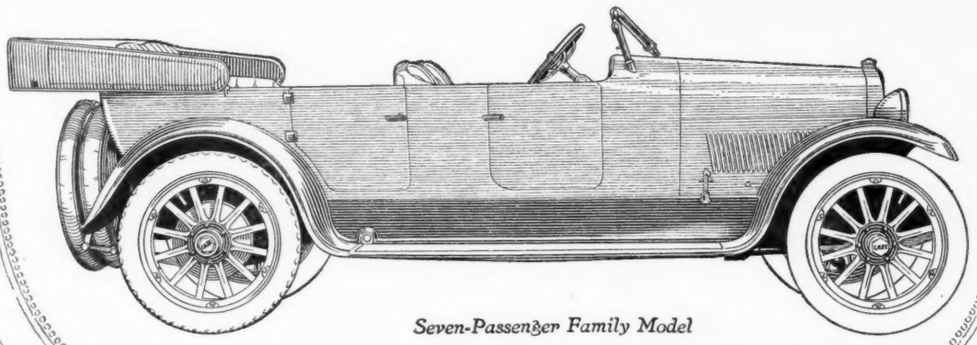
JENKINS VULCAN SPRING CO.

Richmond, Ind.

Factory Branches

St. Louis, Missouri	1402 Chestnut Street
Minneapolis, Minn.	1024 Hennepin Ave.
Dallas, Texas	209 South Houston St.
Reading, Pa.	538 Franklin Street
Sumter, S. C.	29 Caldwell Street

CASE SIX



Seven-Passenger Family Model

Case Engineers Studied All Cars Before They Built This New CASE Six

BEFORE finally designing the New CASE Six, Case engineers searched all motordom, appraising the different advantages of all high-grade cars. They chose for this car the finest features, those most wanted regardless of cost. By a process of elimination this master car was designed.

No one feature predominates. The New CASE Six is an All-Feature Car. Knowing buyers find nothing lacking in this car. When it came to deciding on the price, even we were surprised at its lowness. Case factory efficiency and selling economies enabled us to offer this car at a much lower figure than even we deemed possible.

The Family Model, for seven or five people, dark blue, is offered for $1875. The Sport Model, for four people, color periscope green, is priced at $1875. The All-Seasons Model, Springfield type, color dark blue, sells for $2375.

DEALERS: A limited number of keen business men may obtain this Case Six for their patrons. Perhaps you may arrange to participate with us. If you will write we will gladly tell you.

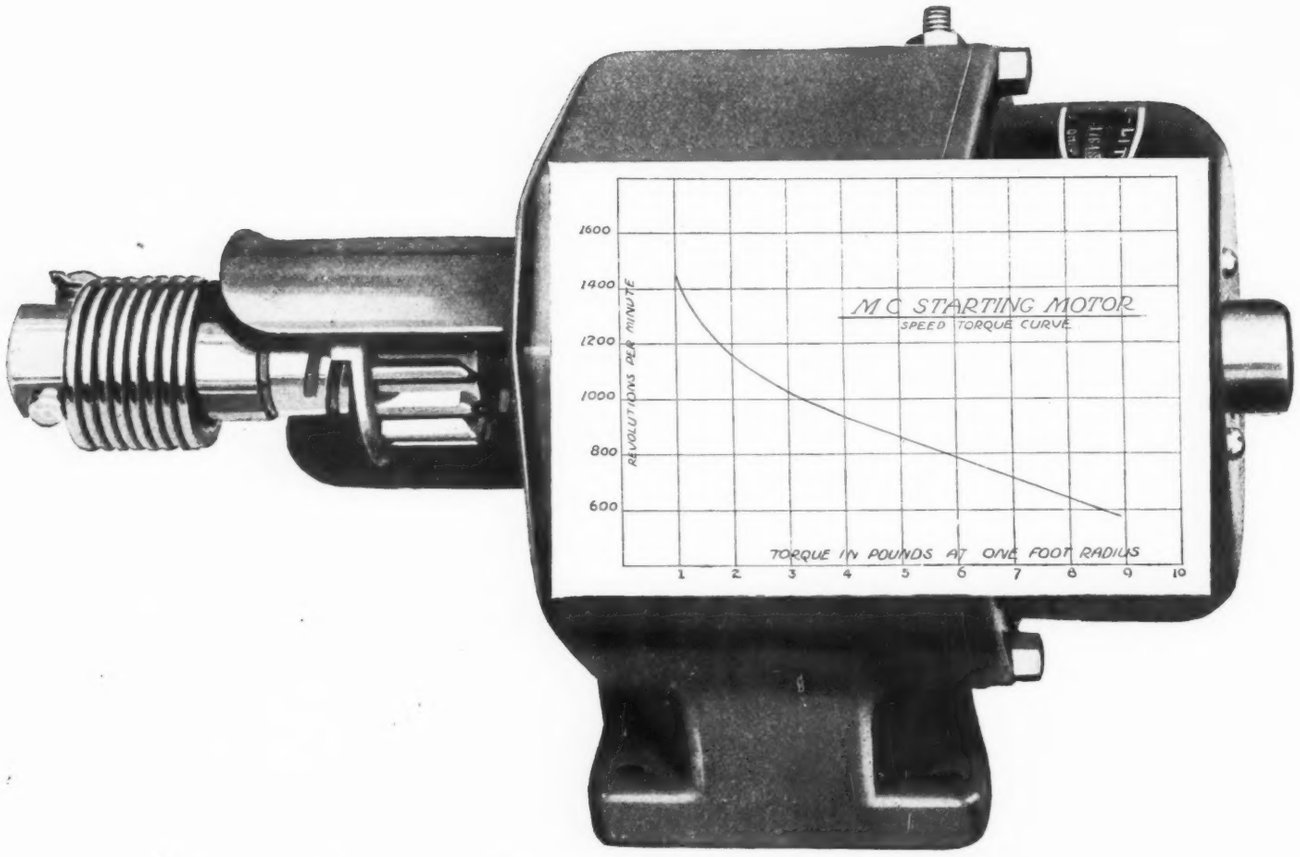
See this car. Ride in it. Drive it yourself. Then compare it with cars costing much more. You will find no other car offers you as much —regardless of price.

(758)

J·I·CASE T·M·CO·INC·*Founded 1842* 282 LIBERTY ST·RACINE, WIS·

Auto-Lite

Starting, Lighting & Ignition



Simple—Rugged—Efficient

FOR automotive engineers the above chart, stripped across a photograph of the Auto-Lite M. C. six volt starting motor, is eloquent of this motor's efficiency.

It shows the amount of torque exerted on the engine fly-wheel at one foot radius. For example at 120 revolutions per minute of the automobile's engine the Auto-Lite starting motor has a pulling power of about one and three-quarter pounds, with a gear reduction of 10 to 1.

The starting motor is geared to the engine fly-wheel from the well-known Bendix Drive at a gear reduction of from 10 or 15 to 1. This means a powerful torque to break away a stiff engine in cold weather and produce high cranking speeds.

The remarkable success of the Auto-Lite system is due in a large degree to its simple and rugged mechanical design, resulting in long life and dependable operation.

The starting motor is series wound to give a maximum "break-away" torque in high working speeds.

It is weather and oil proof.

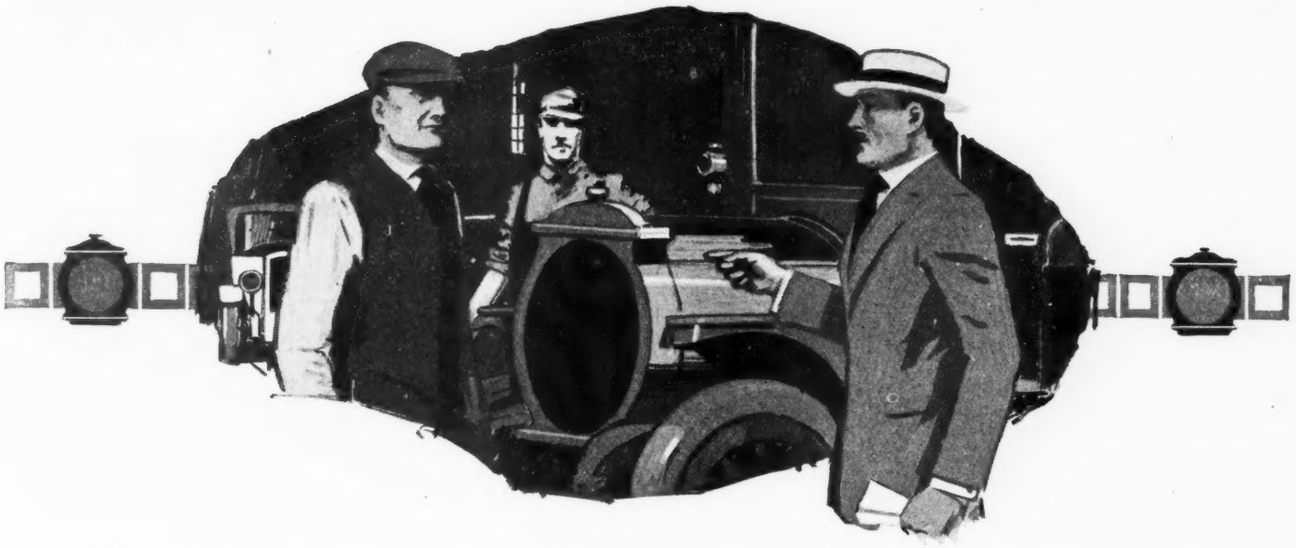
This is our one and only product, therefore a highly specialized product.

The demand for it requires our daily output of 1800.

The world's largest builders of cars use Auto-Lite.

Electric Auto-Lite Corporation

Head Office and Factory, Toledo, Ohio — Detroit Sales Office, 1507 Kresge Bldg.



"I Want You Automobile Dealers to 'Get' This"

"Carl Page and Irvine Fickling in New York, Jim Levy in Chicago, Tom Dunn of Pierce-Arrow fame in Pittsburgh and nearly a hundred other automobile merchants of like calibre in all parts of the country have enthusiastically taken on the Fulton Motor Truck.

"Any one of these men by reason of his experience, his prestige, his reputation and general standing could have handled practically any truck he wanted.

"*But they all chose the Fulton.* Get that. *They all chose the Fulton.*

"And they are all *making money*—and crowding us with a constant stream of repeat orders.

"Consequently we have been forced to greatly enlarge our factory—and to greatly increase production.

This step justifies a gradual increase in our sales staff.

"We want Fulton representatives of the Page-Fickling-Levy-Dunn type in every city of importance

"We want *real motor car merchants*—not just dealers.

"Even if we are represented in your city send in your application. Territories often expand and have to be divided—or old contracts may be revised. At any rate it will do no harm to have your name on our files.

"Write me personally and I'll give your individual case my personal attention."

Wm. Fulton Mellvish Jr.

President
Fulton Motor Truck Company
Farmingdale, Long Island

Send for our booklet "Triple-Heated" Gas.

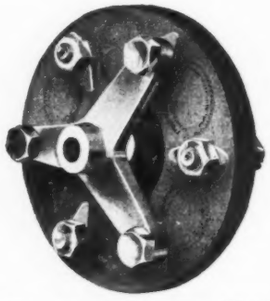
FULTON
MOTOR TRUCKS
FARMINGDALE, LONG ISLAND

Lengthens the life of the chassis

These elastic universals absorb the starting and road shocks

THE life of a chassis is decreased in direct proportion to the sudden shocks or jolts to which it is subjected. A metal universal joint transmits every unnecessary strain from the rear wheels to the motor every time the clutch is engaged. And chains on the rear wheels subject the entire chassis to a terrific jolt whenever the chains strike the ground.

The Thermoid-Hardy Fabric Universal Joint being elastic absorbs these shocks and acts as a cushion between the rear wheels and the clutch. The transmission is afforded a time element, reducing ultimate crystalization and excess wear on all bearings.



Three-armed spider type of flexible disc universal joint. Noiseless, frictionless and easy to install

Method of building up disc. Notice how the layers are fanned out to give uniform strength

How Thermoid-Hardy Universals are made

Built up of alternate layers of woven and specially treated fabric, they are cured by methods devised only after a long series of experiments. The method of assembling and the type of cotton and cure used, make them highly elastic and insure uniform strength between each series of holes.

Why they wear long

These universals are practically indestructible. Besides being highly elastic and maintaining this quality, they are unaffected by water, oil or heat to which they are subjected in motor service.

Thermoid-Hardy Universals are not an experiment. Sixty leading automobile, truck and tractor makers are using them as a "motor to transmission" coupling as well as on the propeller shaft.

They find that these universals not only absorb all shocks but because of the absence of "metal to metal" surfaces, lubrication is unnecessary.

Send for printed matter giving fuller information and the names of the cars in which these universals are used. Every Thermoid-Hardy Fabric Universal is backed by our guarantee—

Thermoid-Hardy will make good—or WE WILL

Thermoid Rubber Company

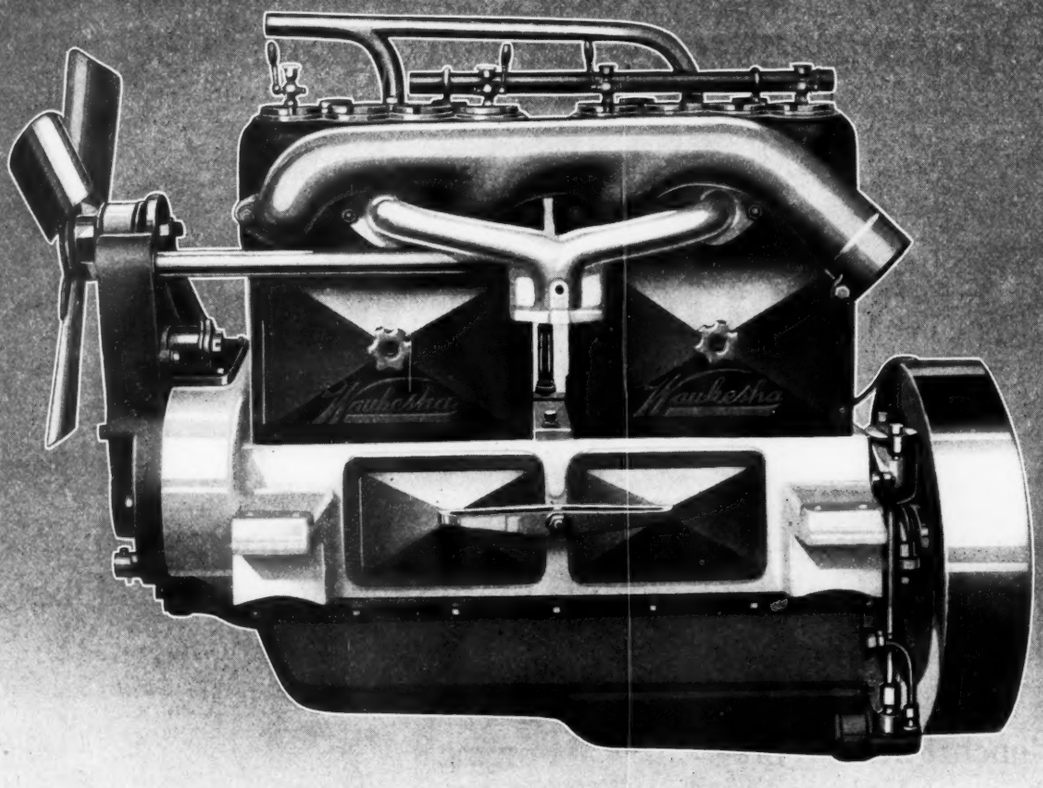
Sole American Manufacturers

Factory and Main Offices: Trenton, N. J.

BRANCHES:

New York Chicago San Francisco Indianapolis
Detroit Los Angeles Philadelphia Pittsburgh Boston

THERMOID-HARDY
FABRIC FLEXIBLE COUPLING
PATENTED FEB. 22, 1916



War's Demands are Enormous

—and war's demands must be met ahead of everything else. The great inland transportation systems here and in France must be completed. The great food producing areas must be motorized. Like all war-working Americans, the producers of

Waukesha
TRADE MARK

Four-Cylinder Motors for Trucks and Tractors

have unhesitatingly given preference to governmental requirements, that the war may be brought to a speedy and victorious end. Therefore, users and the many manufacturers who desire to adopt Waukesha Motors, are asked to be patient until facilities can be expanded to meet these unusal conditions. We are doing our very best that all may be served and served well.

WAUKESHA MOTOR CO., Waukesha, Wis.

World's Largest Builders of Truck and Tractor Motors Exclusively

Quick Service and Profitable Results

can be secured by consulting the

CONTRACT WORK DEPARTMENT

as found on page 98 of this week's number, when in the market to place surplus manufacturing work along the following lines:

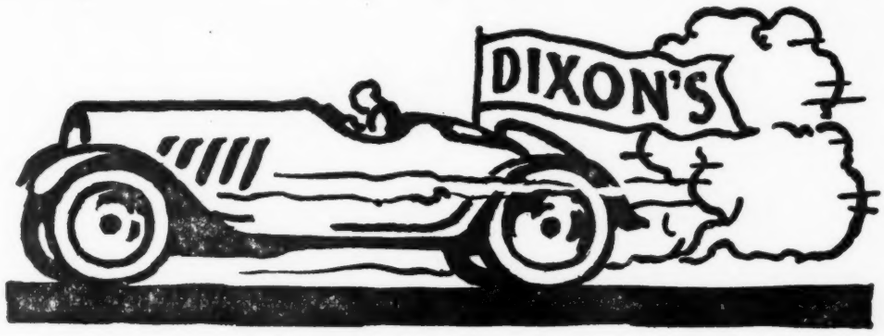
Punch Press Work
Screw Machine Work
Machine Parts
Gear Cutting
Grinding
Cam Cutting
Bar and Clutch Work
Forgings
Drop Forgings
Lathe & Milling Machine Work
Patterns (wood and metal)
Plating
Automobile Stampings

and all other surplus manufacturing lines

Contract Work Department

AUTOMOTIVE INDUSTRIES
THE AUTOMOBILE

239 West 39th Street, New York City



Dixon's Come Through with Flying Colors

In the automobile racing world, a list of races run is a list of races won by Dixon's. Practically every noted driver uses

DIXON'S GRAPHITE Automobile LUBRICANTS

"The graphite is the reason"

Racing drivers must keep their cars friction-free or their chances of winning go a-glimmering. They use Dixon's to prevent friction because they *know* Dixon's will not fail them in a pinch.

"Dixon dependability" has won the racers' endorsement. "Dixon dependability" will give you day-in-and-day-out service when your bearing surfaces are Dixonized.

Dixon's cover the metal surfaces with a long-wearing film of specially selected flake graphite that makes your car run better and gives it a new and a longer lease on life. Write for the Dixon Lubricating Chart No. 78-G.

JOSEPH DIXON CRUCIBLE COMPANY

JERSEY CITY, NEW JERSEY

Established 1827

Steel for Service

Gear Investments

Investments which yield returns of 900 per cent to manufacturers over any reasonable period of time merit consideration.

Tens of thousands of gears are bought every year by manufacturers; many thousands of them are bought for replacements which come oftenest and are most costly in rushed plants.

In addition to the cost of new gears replacements mean removal and installation expenses and often heavy losses due to interruptions to production.

Gears made from

Carnegie Rolled Steel Blanks

have great strength and toughness and usually wear four times as long. Due to careful selection of materials, special rolling and forging, accurate machine cutting, and uniform heat treating they cost about 30% more than cast steel gears.

But this 30% extra cost yields a return of 900 per cent during life of gear in the cost of new cast steel gears that it saves.

Gears made from Carnegie Rolled Steel Blanks are a worth-while investment.

Carnegie Steel Company

General Offices: Pittsburgh, Pa.

1103

PRESSED STEEL PARTS

OIL PANS
GEAR COVERS
GAS TANKS
MUFFLERS—DOOR HINGES
CRANK CASES

Thirty-seven years of successful business, fifteen acres of floor space, a strictly modern equipped plant, an organization of specializing experts are a few reasons why it will be to your advantage to let us furnish estimates from your blueprints.

Our name plate has always stood for quality, integrity and highly developed workmanship. We mean to live up to that reputation.

GEUDER, PAESCHKE & FREY CO.
1422-1700 St. Paul Ave., Milwaukee, Wis.

G.P.&F. SERVICE
"KNOWING HOW SINCE '81"

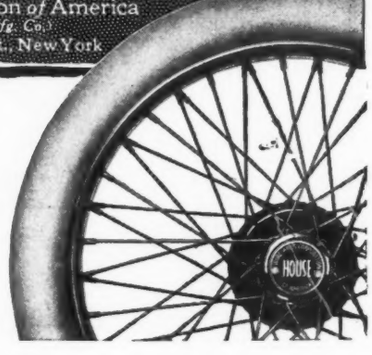
WIRE WHEELS
HOUK TYPE
for 150 makes of cars.
Write for full information and prices on wire wheels for any make or model of car.

DEALERS!

Wire Wheels are *sellers!* Get particulars of wire wheel service and sales agent's propositions.

Ford distributors and accessory dealers should write for special service and sales proposition for HOUSE type Wire Wheels for *Ford* cars.

Wire Wheel Corporation of America
(Successors to Houk Mfg. Co.)
835 Eleventh Ave., at 57th St., New York



HOUSE TYPE for Fords

List price for set of 5 wire wheels, 4 inner hubs, 4 hub caps, hub cap wrench, spoke nipple wrench, 1 hub dust cover for spare wheel, $60. White, black, red. Color optional.

PARK-FORGED

COUNTER BALANCED CRANK SHAFTS

Patented July 10, 1917

Quick Get-a-way
Higher R.P.M.
Reduced vibration
Smoother running motor
Eliminated bearing troubles

We have shipped 63,521 Counterbalanced Crankshafts to June 22, 1918

The Park Drop Forge Co.
Cleveland

"WHITNEY"
TRANSMISSION CHAINS

The Flexibility of a Belt
The Positive Connection of Gears

SILENT TYPE

For driving cam-shafts, magnetos, lighting systems, generators, pumps, self starters, etc., on automobiles and for machine tools, line shafts, electric motors, compressors, etc., in the factory.

Our carefully constructed cylindrical joint gives a large bearing surface which insures accuracy, long life, and minimum elongation. If you contemplate the use of silent chain, don't fail to try the "Whitney." Our engineering department will be glad to assist you to secure maximum efficiency and service.

THE WHITNEY MFG. CO. **Hartford, Conn.**
Chains Keys and Cutters Hand Milling Machines

TRADE DRIDEK MARK REG.

The Most Remarkable Top Material Yet Produced

There is one thing about DRIDEK—it is always just the same! Every piece, every yard, has that same perfect finish that will not scratch or blister.

When you want a fine, snappy top; or attractive, soft upholstery — buy a car that is trimmed with DRIDEK. Absolutely waterproof, and will not scratch or blister.

DRIDEK Tops turn out well, and are a source of continuous satisfaction to the car owner.

Send to Dept. A for samples and prices of DRIDEK.

L. J. MUTTY CO.
BOSTON, MASS.

STEEL
WHEN YOU WANT IT

We are specializing on Motor Truck and Tractor Steels and 'twill pay you to get in touch with us right away. Our stocks are heavy now, and shipments can be made quickly.

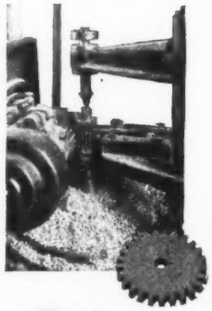
ABORN MOTOR TRUCK STEELS

should be secured now. Get these steels under your roof while you can. We have them, they are yours for the say so; the sooner you say so the better for you. Right now is the time to place your order.

Century Steel Works
Poughkeepsie, N. Y.
Aborn Steel Co., Inc.
40 Clarke St., New York City

Buffalo, N. Y.....520 Marine Bank Bldg.
Philadelphia, Pa.....269 Drexel Bldg.
Rochester, N. Y.....133 Andrews St.

160



Milling Speedometer Sprockets

Diamond-Fibre is so free of metal, grit and other foreign substances that high-speed millers and other cold tools bite into it as easy as though it were babbitt metal. You can machine

Diamond-Fibre

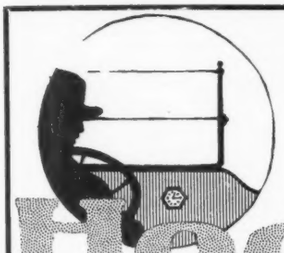
just the same as metal. You can bore, saw, turn, tap, countersink it. It cannot be moulded, but it may be bent or formed under heat pressure. Diamond-Fibre is furnished in three primal shapes—sheets, rods and tubes; also in numerous special shapes—gaskets, wire, manifold tubes, gears and sprockets, insulation, etc.

Diamond-Fibre offers rare opportunity for automobile manufacturers in replacing scarce and high-priced materials. Write us freely for samples and other information. We are ready to co-operate with your engineers and chemists.

Diamond State Fibre Company

Bridgeport, Pa. (Near Philadelphia)
Offices in Principal Cities

A Mark of Quality F Diamond-F *A Sign of Service*



Every tick of the clock means

1041

HOOVER

Steel Balls made

Our production is 1041 steel balls every second of every work hour.

You may be sure that to the quality of Hoover steel balls is due this quantity production—30,000,000 daily; by far the largest production in the world.

The importance of perfect, scientifically constructed steel balls is fully realized by mechanical engineers, whose demands for Hoover steel balls have necessitated an increase in manufacturing capacity from 3,000,000 daily, to its present high figure.

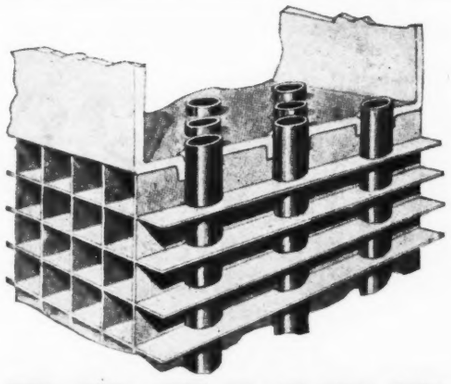
95% of all motor cars and motor trucks carry Hoover Steel Balls.

HOOVER STEEL BALL COMPANY

Ann Arbor, Mich., U. S. A.

HOOVER

Steel Balls



BREMER

Fin Tube Type Radiators

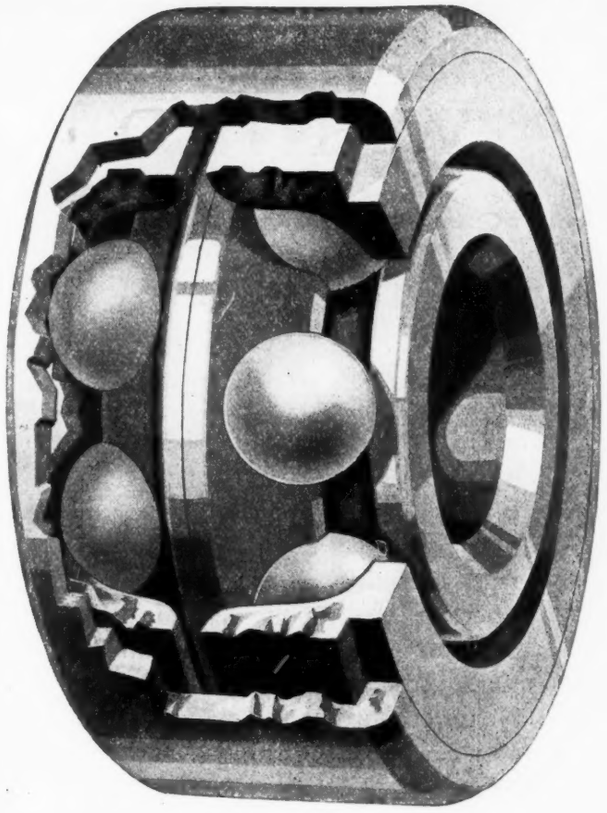
Serve Best for Motor Trucks and Tractors

BREMER Radiators are the highest development of the fin tube type, which predominates in all heavy duty service. Permit use of header plate. Have strongest possible construction of core. Least subject to injury. Straight tubes will not clog.

BREMER Radiators are Economy Radiators
Ask Us Why

BREMER MANUFACTURING COMPANY

Farquer and Canal Sts Chicago, Ill.



A Master Bearing—

because it combines the duties of three ordinary bearings and does it better and cheaper.

It supports vertical as well as horizontal shafts—resists thrust as well as radial loads, and in any combination—is compact in design and permanent in its tamper proof adjustment.

The ideal bearing for 75% of the uses to which anti-friction bearings may be put.

Let us show you how it fits into **your** work.

The New Departure Manufacturing Co.

Bristol, Conn. Detroit, Mich.

New Departure

Ball Bearings

1046

WANTED

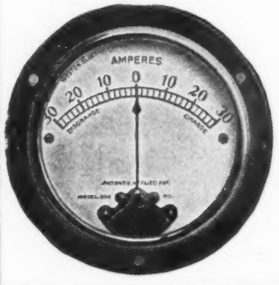
Steel Production Manager

EXCEPTIONAL opportunity for one who knows steel business, to take part in direction of up-to-date plant producing high speed and alloy steels. Connection may be active or advisory. Contract liberal in all features. Proprietary interest if desired. All communications strictly confidential. Address Banker,
care of Automotive Industries,
239 West 39th St., N. Y.

Dyneto TRADE MARK REGISTERED
Electric Starting and Lighting Systems
SINGLE UNIT and TWO UNIT Equipments
Booklet on Special Ford Equipment
DYNETO ELECTRIC CO., Syracuse, N. Y.

Out Go the Lights—

All of a sudden—without warning—very likely at the worst part of the road! Don't guess at the condition of your electrical equipment. Put a



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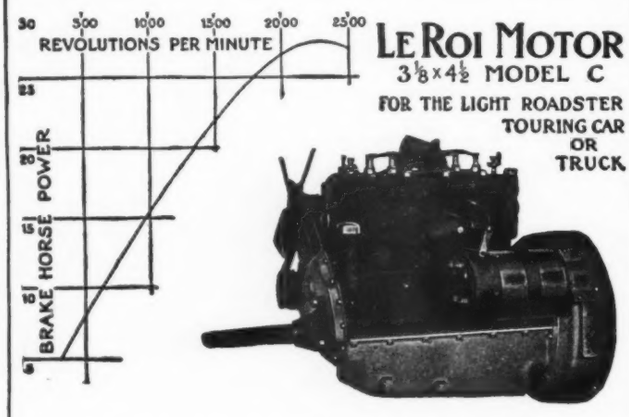
MODEL 354 AMMETER
On Your Dashboard or Cowl

It is the reliable means of determining the proper rate of charge or discharge of your battery for various speeds. It enables you to determine that the generator is working and that the storage battery is receiving its proper charge. *Write us!*

Weston Electrical Instrument Co.
8 Weston Ave., Newark, N. J.
23 *Branch Offices in the Larger Cities*



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FOR THE LIGHT ROADSTER TOURING CAR OR TRUCK

Used by leading manufacturers of best-known American-made light trucks.
The business of manufacturing Le Roi Engines, formerly conducted by Milwaukee Machine Tool Co., is now carried on by

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–Used by 155 Motor Car Builders and Motor Truck Builders

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The spare quarters that you invest in War Savings Stamps and Thrift Stamps help Uncle Sam to clothe, to feed and to arm those boys in khaki.

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Get a Thrift Stamp, pasted on a Thrift Card, TODAY—at any post-office, bank or trust company, drug, cigar or department store, or any other place showing the W. S. S. agency sign.

NATIONAL WAR SAVINGS COMMITTEE
Washington, D. C.

This space contributed to the Winning of the War by
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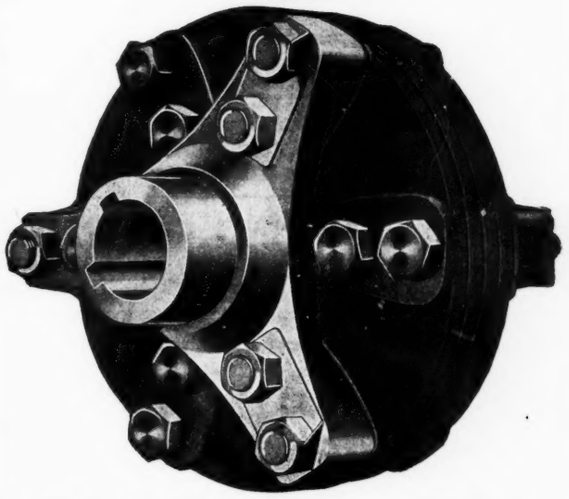

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TRUCK MOTORS

Note these features

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3 POINT SUSPENSION.

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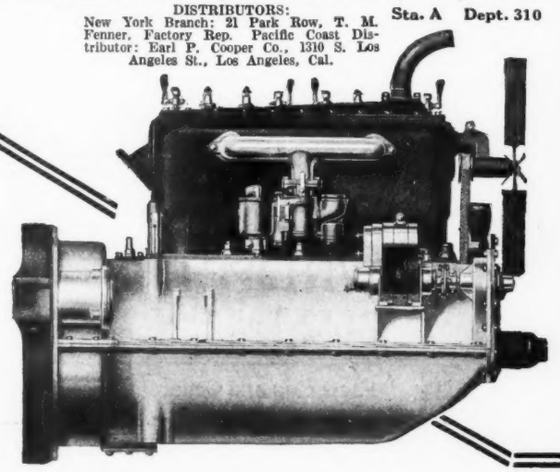
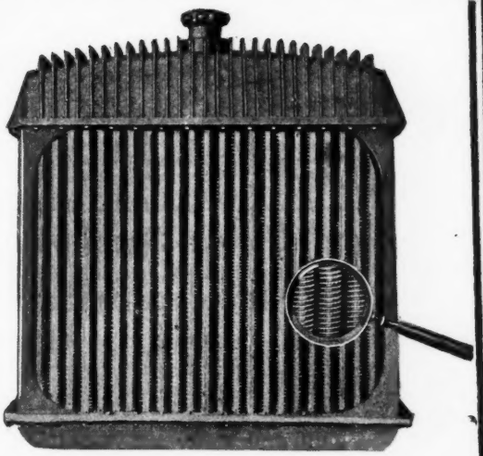


RADIATOR INSURANCE



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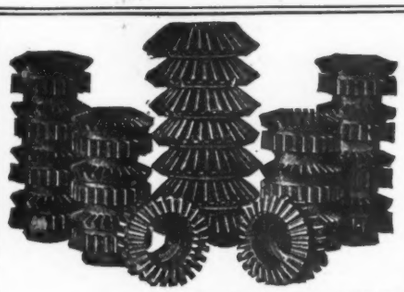

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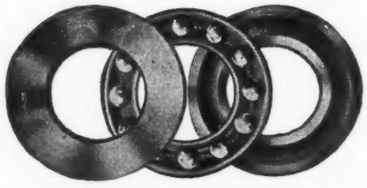

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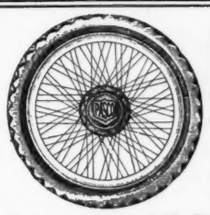

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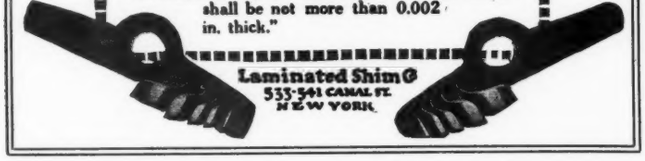

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protects Transmission Gears and works into Shaft Bearings.

Here is an important point that many car owners overlook.

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Use "K00 special" grade of NON-FLUID OIL in your transmission case and for oil tight rear axles. Use "K000" for bearings.

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Easily put in place;
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Smooth — sure — quick-acting.
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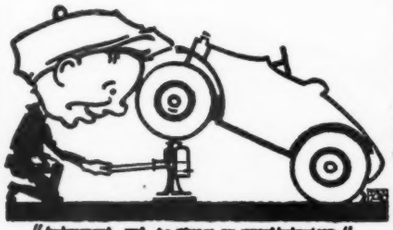

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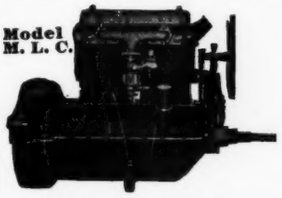

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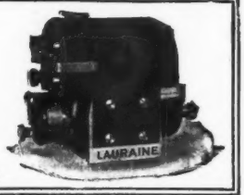

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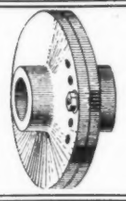
This "Straight Side" Type is Made Also in Clincher Type



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In Use Two Years.
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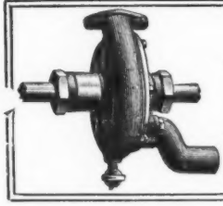

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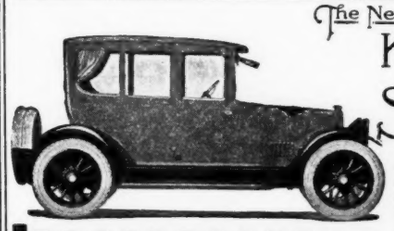
The New KISSELKAR 4 Passenger Sedane



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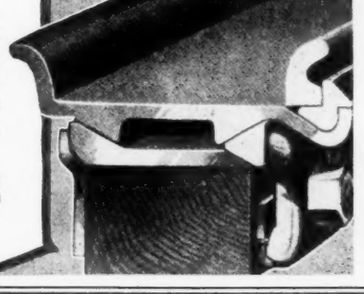

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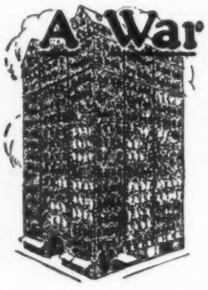

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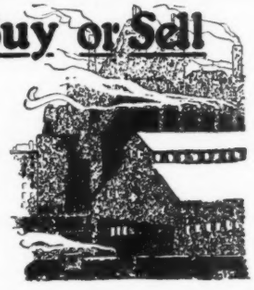

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Continued on Page 103

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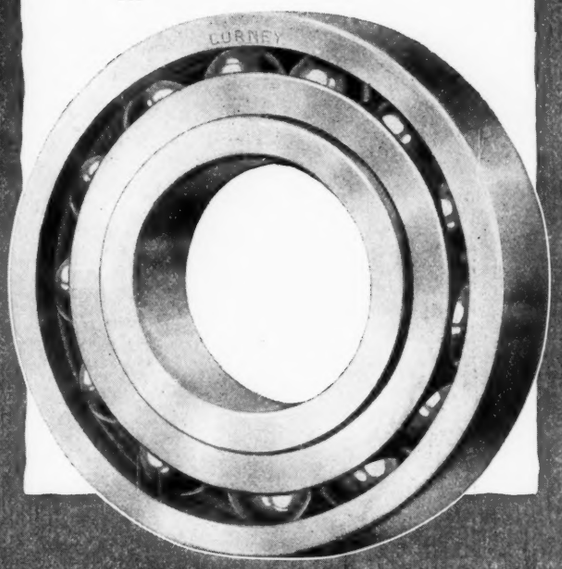

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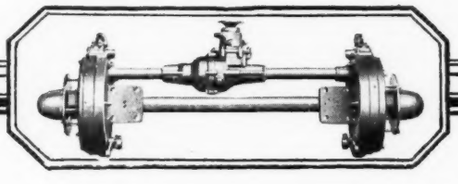

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